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**A MANAGERS VIEW OF CRITICAL SUCCESS
FACTORS NECESSARY FOR THE SUCCESSFUL
IMPLEMENTATION OF ERP**

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DEDICATION

This paper is dedicated to my Mum Kathleen, who has been an inspiration to me for so many years.

I also dedicate this paper to my son James and daughter Lydia. They understand the effort involved in producing this paper, which I hope will be an inspiration to them both at the time of their future studies.

Most of all, I would like to dedicate it to my wife Tracey who has assisted me much more than she knows throughout the course of my MBA studies.

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I am grateful to all of the teaching staff at Chester University whom I have worked with over the duration of my MBA.

In particular, I am grateful for the input and assistance of my supervisor and mentor Professor Tony Proctor. Without knowing, he has been an inspiration to me throughout my course of study and will continue to be so.

ABSTRACT

Organisations look to enterprise resource planning (ERP) as a significant strategic tool of competition. ERP plays an important role in today's enterprise management and is beginning to be the backbone of organisations. Although ERP has been recognised as a useful tool, in practice, there are many difficulties in compelling people to implement it effectively. In this case, how to help ERP's future effective implementation has already attracted the attention of several researchers.

The goal of this research was to increase the knowledge base regarding Enterprise Resource Planning (ERP) Software implementation in the public sector. To this end, factors regarding benefits sought through ERP system implementation and critical factors surrounding successful ERP implementation were identified. In addition, the perception of project team members' satisfaction with modules implemented and their concerns about implementing ERP software were identified in this study.

The results of this study provided recommendations for public sector organisations in order to increase their opportunity for successful ERP system implementation. However, there is no reason why this information cannot be considered to be useful to private sector organisations when considering ERP implementation projects.

The literature review and results of this study suggested that the benefits sought during ERP system implementation included increased standardisation, better reporting, and reduced operational costs were recognised as goals of ERP software implementation, with the overarching goal to improve efficiency. Factors that were important to successful ERP system implementations were top management support, knowledgeable and experienced project managers and knowledgeable and committed team members.

The study included recommendations for organisations to fully research ERP functionality prior to implementation, to implement strong change management, use other means of measuring return on investment, ensure employee buy-in and top management involvement and to avoid scope creep at all cost. In addition, a key element is to undertake some form of benchmarking exercise of existing systems prior

to commencement as a measure of success of implementation of all or various elements of ERP.

KEYWORDS

Critical successful factors (CSF); Enterprise resource planning (ERP), *Public Sector*, *Motivations*

DECLARATION

All work is original and has not been submitted previously for any academic purpose.

All secondary sources of information are acknowledged.

Signed:

Date:

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CHAPTER 1

INTRODUCTION

Companies today are radically changing their information technology (IT) strategies by purchasing standard package software. Enterprise Resources Planning (ERP) software integrates and centrally manages the business functions of an organisation (Buxbaum, 2001). Price Waterhouse predicted that by the year 2000, two thirds of all business software will be bought off the shelf. While some researchers argue that studying IT management in public organisations is “more of the same” when compared with private enterprises, others see the public sector either as a moderating factor or even as “a whole new ball game” (Zmud, Carte and Te’eni, 2004).

Members of the public expect their local authorities to provide high quality services, adapted to the most recent developments in the political, economic, social, and technological environments, and at the lowest cost. It is generally in response to these expectations that methods, techniques, or practices that appear promising in the private sector, customer relationship management for instance, are now made use of in the public sector (Periseras and Tarabanis, 2000; Veal, 2001; Liu and Lai, 2004).

On the more specific issue of (ERP) systems, the need to develop a body of knowledge specific to public organisations is appreciated more and more (Allen, Kern, and Havenhand, 2002). Blick, Gullledge and Sommer (2000) demonstrate that ERP implementation approaches used in the private sector must be adapted to suit the culture and regulations peculiar to the public sector.

Even though the private sector is the main market, more ERP vendors have seen opportunities to develop systems specific to the public sector (Deloitte Research, 2002). Proportionately, however, sales performance in this sector by ERP vendors has remained modest (Miranda, 1998).

The public sector market remains attractive mainly due to its great size and because it must take advantage of the benefits derived from ERP by the private sector (Sprecher, 1999). It would appear that the ERP market began to depend on the public sector to give it new impetus, at a time when this market began to shrink.

Significance of the Study

ERP implementation projects have continued to grow in public sector organisations. Given the significant financial investment and significant risks involved, it is critical that ERP projects are properly implemented and managed to ensure successful implementation.

It is important therefore, that organisational leaders have appropriate information available to make intelligent, strategic decisions when considering potential ERP projects. It is also important that they fully understand the risks associated with the implementation of an ERP project.

Purpose of the study

The purpose of this study is to examine prerequisites for successful implementation of ERP system from the project management perspective.

The outcome of this research paper will be useful for IT managers, project managers and business managers involved in ERP implementation projects in the future. This will apply particularly to top management who will be making difficult strategic decisions whether or not to implement ERP for the first time.

This project aims to identify why, given the presence of previously researched CSFs, ERP implementation within a public sector organisation can be unsuccessful.

Focus of the Study

This study focuses on critical success factors as these play a central role throughout the ERP implementation, usage and evaluation process. The system's extensiveness, design and implementation approach depend in good part on the motives leading to its adoption by the organisation (Parr and Shanks, 2000). This study has extended the work of others who have explored the differences in the factors affecting ERP success, and will focus on the importance of risks, benchmarking, critical success factors, BPR and project management. The research involved actual ERP implementation team members and employees at all levels within the organisation to obtain accurate and constructive feedback, during an actual implementation of a SAP ERP project.

Research Questions

The following research questions guided this study.

- Did ERP implementation realise the intended benefits?
- To what degree were critical success factors present or considered during ERP implementation.
- Were project team and end users satisfied with the ERP modules implemented?
- What problems and concerns did staff have before, during and after implementation of ERP.

Background to the study

The focus centres on the determination of local authorities to become more efficient by embarking on a journey of significant risk and uncertainty, involving implementation of a SAP ERP system. The public service can only retain legitimacy by changing the way that it is managed. In many cases, the change will be ritualistic Meyer and Rowen (1977).

It is difficult to measure objectively the performance of the public service. There is a tendency to imitate those of private sector organisations that are seen as effective (Dimaggio and Powell 1985). The result is that change is not introduced to solve specific problems, but to express ideological commitment.

With regard to accountability and performance, the key factor is clearer roles and efficient systems, performance targets, and accountability for council executives, managers and staff, and crucially a greater sense of corporate identity (Major 1989, p. 5).

Justification for the research

Businesses and public sector organisations face a stark reality: anticipate, respond, and react to the growing demands of the marketplace, or perish. In a fiercely competitive environment, business strategy not only determines success, it governs business survival. Effective business strategy centres on efficient use of information technology e.g. ERP.

The difficulties and high failure rate in implementing ERP systems have been widely cited in the literature (Davenport, 1998). To date, little has been done to theorise the important predictors and monitoring techniques for initial and ongoing ERP implementation success (Brown and Vessey, 1999).

This research is an attempt to achieve that. It identifies the CSFs in ERP implementation, categorises them into the respective phases and discusses the importance of these factors in ERP implementation.

Problem Area and Significance

IT project failures have been widely documented in the press. In 1995, The Standish Group conducted research on IT application projects, titled "CHAOS". Project success was defined as "completed on-time and on-budget, with all features and functions as initially specified". The 1995 study of 8,380 projects showed that 83.7% of them failed one way or the other. In 1998, the study expanded to 23,000 projects, the failure rate was 74% (The Standish Group Inc., 1995; Kenagy, 2000). This was supported by the British Computer Society in 2000. In this study, "success was defined as delivering to the sponsor everything specified to the quality agreed on or within the time and costs laid out at the start". (The British Computer Society, 2000, online). Out of 1,023 projects, only 130 were successful according to survey respondents, which amounted to an 87.3% failure rate (The British Computer Society, 2000).

Contrast between success and failure, as well as the high costs associated with ERP systems has prompted managers to search for factors contributing to ERP implementation success (Mendel, 1999). Many studies are available on the topic of ERP software and its implementation. Perspectives include project management, change management, knowledge management, communication, risk management, Welti, 1999 training, data conversion, etc. (Knemmergaard and Moller, 2000), some of which will be covered in this study.

Methodology

The research method of literature review (Leedy, 1997) is employed to assist the researcher in addressing the purpose of this study, which is to relate prerequisites for a successful implementation of ERP system to project management problem areas.

The research is approached from a subjective perspective, adopting the philosophical position of 'Realism', to guide the project. It also uses an Inductive research approach to develop a theory from the analysis of data.

The methodology is covered in detail in chapter three.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

ERP systems have been adopted by many businesses since 1990. ERP has transformed organisational computing by integrating business processes, sharing common data across the entire enterprise, and producing and accessing information in a real-time environment (Bradford, 2001).

The primary goal of ERP has been to improve and increase information flow within an organisation (Norris et al, 2000). This is achieved by integrating departments and functions across a company onto a single computer system that serves the needs of all of the different departments. Integration and the sharing of a common database eliminated duplication by keying the same information into different computer systems. Single entry of information also minimises the risk of errors and duplication (Koch et al, 2001).

Despite proposed benefits, many companies have had significant problems implementing ERP systems. ERP systems are notoriously complex, and installing the software often forces organisations to change their internal processes. These problems have caused many companies to abandon their ERP initiative or implement the system in limited capacity (Bradford, 2001). Prior to ERP software implementation, processes may not have been efficient but they were simple. ERP forces departments to integrate and communicate across departments. This can be exceedingly difficult (Koch et al., 2001).

The rise in popularity of ERP software and the evidence of continued ERP implementation in both the public and private sectors makes it important for senior management to understand the concerns and advantages and risks involved when implementing ERP software.

Motivations for the Adoption of ERP Systems

Oliver and Romm (2000), suggest three categories of factors that determine an organisation's initial search for an ERP solution: 1) The need to improve the performance of current operations, 2) The need to integrate data and systems, 3) The need to prevent a competitive disadvantage or a business risk from becoming critical.

Ross and Vitale (2000) identify six reasons generally cited by enterprises, classifying them into three categories (infrastructure, capacity, and performance) and underscore their overlapping character.

Modules of ERP

Modules of an ERP system refer to the business function (e.g., human resources) for which a group of applications (e.g., payroll) are created to support. Each ERP system offers different modules. Hoffman (1998) provided a description of ERP modules:

1. Manufacturing and Logistics Module - A group of applications for planning production, taking orders, and delivering products to the customer. Examples are production planning, materials management, order entry and processing, warehouse management, transportation management, project management, plant maintenance, and customer service management.
2. Finance Module - A group of applications for managing the bookkeeping functions of the organisation. This module includes general ledger, accounts payable and receivable, fixed assets, treasury management, and cost control.
3. Human Resources Module - A group of applications for handling personnel-related tasks for corporate managers and individual employees. This module includes payroll, personnel management processes (such as recruitment and vacation allotments), and self-service human resources. (p.2)

Benefits of an ERP System

According to Gumaer (1996), accounting was one of the first business applications to be computerised. Software is the enabling technology that allows an organisation to automate a particular aspect of its business. The goal for any enabling technology is to allow an organisation to more readily achieve its business mission (Reed, 2002). According to Weston (1998), ERP users can achieve their business mission and gain competitive advantage from the way they implement the ERP system and exploit the

resulting data. "ERP is a set of building blocks, and it is how those building blocks are put together that gives an organisation an advantage" (Towner as cited in Weston, p.2). Several researchers identified seven benefits of an ERP system: (a) easier access to reliable information; (b) elimination of redundant data and operations; (c) reduction of cycle times; (d) cost reduction; (e) adaptability in a changing business environment; (f) Year 2000 enabled; (g) Euro enabled. Organisations usually implement ERP software to accomplish one or all of the benefits listed above, hence the motivations for implementing an ERP system.

One of the biggest gains from ERP packages is that they force a company to institute a proven set of business processes. In addition, ERP systems also allow companies to turn on and off functionality as needed to adapt quickly to changes in their business, whereas a customised application has to be rebuilt (Weston, 1998). ERP systems are designed to respond quickly to new business demands and can be changed to respond to the changing environment. Most ERP software vendors purport flexibility as one the advantages of the software (Miranda, 1999).

ERP vendors are constantly evolving to meet the changing business demands and to allow the organisation to move nimbly and adapt quickly to changes in the business environment (Weston, 1998).

Costs of an ERP System

There are clearly financial costs associated with implementing ERP. Reed (2002) stated that the cost components of an IT project are software, software support, support infrastructure, customisation, implementation, training, and change management. Koch et al. (2001) stated that the overlooked costs are training, integration and testing, data conversion, data analysis, consultants ad infinitum, replacing the best and brightest employees, implementation teams who never cease to exist, waiting for the return on investment, and post-ERP depression. In companies with more than \$500 million in revenues that had implemented ERP, the average cost overrun was 178% and the average schedule overrun was 230% (Miranda, 1999).

In addition, Komiega (2001) stated that the consulting costs can equate to 50% of the total project costs. Training the entire organisation could account for 10 to 20% of the total project cost. There has also been a significant cost associated with design and

testing from operations, as well as the cost to an internally supported ERP with a dedicated staff.

Companies also underestimated support costs for the year following initial implementation by an average of 20%. More companies saw their support costs increase rather than decrease in their pre- versus post-ERP environments. The most difficult support tasks were the incorporation of work process changes, software upgrades, support of gap solutions, and the addition of functionality (*Enterprise resource implementation still tough*, 2001).

According to Umble and Umble (2002), not only do ERP systems require considerable time and money to implement, the implementation can also disrupt a company's culture, create extensive training requirements, and lead to productivity dips, low morale and mishandled customer orders. Experience indicates that about 50% to 75% of firms in the United States experience some degree of failure when implementing advanced manufacturing or information technology.

ERP Implementation

Implementation Strategies

ERP systems come in modular fashion and do not have to be implemented entirely at once. Several companies follow a phase-in approach in which one module is implemented at a time (Bingi et al., 1999). SAP, a leading ERP vendor, (used in this particular case) recommends this approach.

With true ERP strategy, a single vendor provides a solution that is viewed as the overall best for the organisation as a whole. This strategy seeks to reduce the total cost of ownership of enterprise applications (Miranda, 1999). Koch et al. (2001) referred to this as the Big Bang strategy, in which companies cast off all their legacy systems at once and implement a single ERP system across the entire company. This was the approach adopted in this case.

Implementation Project Management

Managers are often surprised by the scope, size, and complexity of an ERP implementation. As a result, management sometimes does not initiate the necessary level of detailed project management planning and control (Umble & Umble, 2002).

Bingi et al. (1999) stated that implementing any integrated ERP solution is not as much a technological exercise but an "organisational revolution." Extensive preparation before implementation is the key to success. Implementations must be carried out with patience and careful planning in order to achieve competitive advantage. The longer the implementation process takes to complete, the greater the risk to the success of the project (Reed, 2002).

There are many suggestions as to how an organisation should prepare for ERP implementation. Umble and Umble (2002) identified six prerequisites for ERP implementation project success:

1. Organisational commitment
2. Clear communication of strategic goals
3. View ERP as an enterprise-wide venture
4. Select a compatible ERP system
5. Ensure data accuracy
6. Resolve multi-site issues (pp. 3 - 7)

Jacob and Wagner (1999), identified the five phases of an implementation project plan: (a) initiation, introduction of the software; (b) orientation, configuration for business processes, (c) development, such as developing interfaces; (d) pre-production, preparing for rollout; (e) post-production, focus on ancillary functionality and features of the system to be rolled out in the future. In addition, Komiega (2001) warns that project managers must also remain mindful of scope creep, budget constraints, and immature consulting.

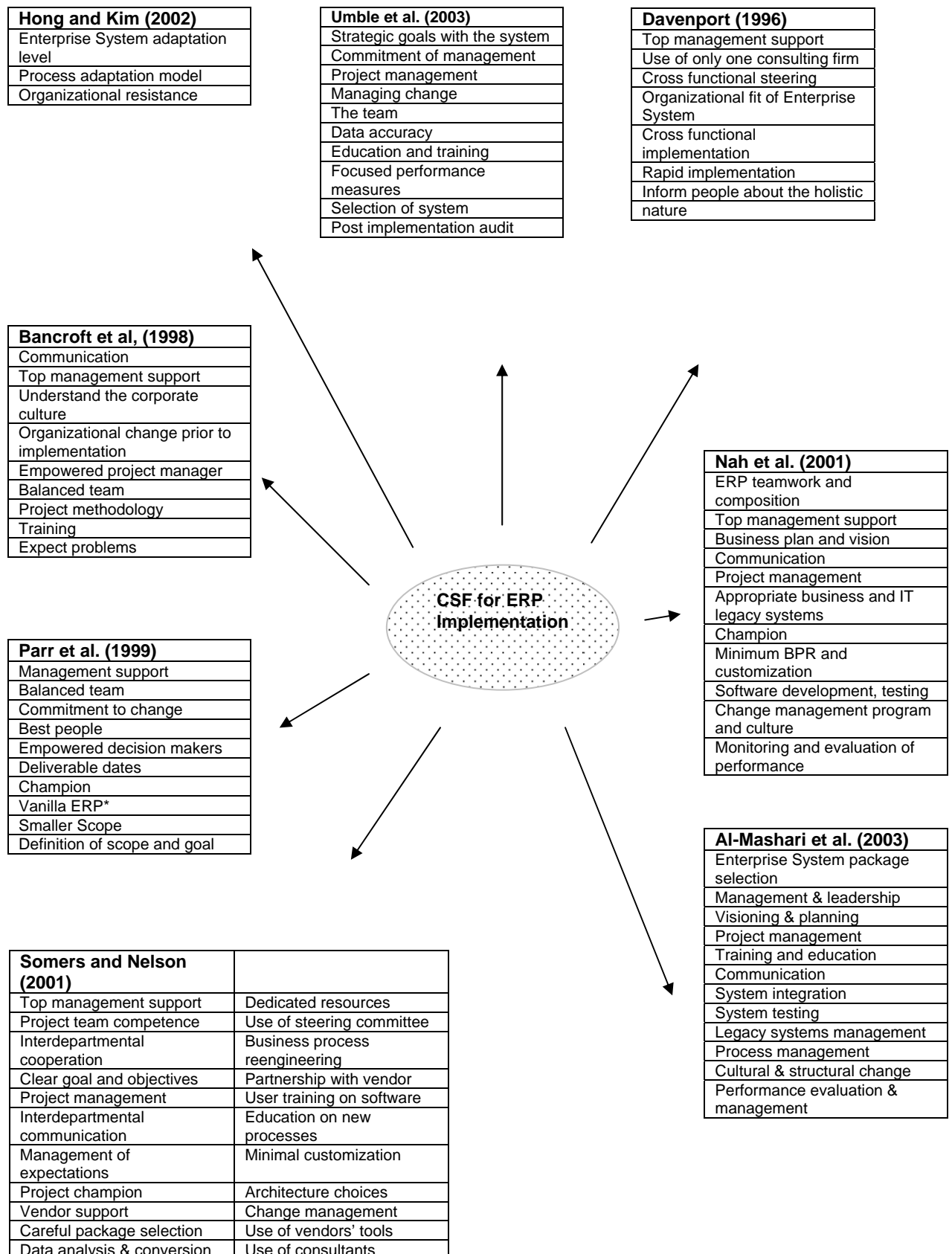
Implementation of Critical Success Factors (CSFs)

Somers and Nelson (2001) defined critical success factors (CSFs) as situated exemplars that help extend the boundaries of process improvement, and whose effect is much richer if viewed within the context of their importance in each stage of the implementation process. The implementation process consisted of six phases: initiation,

adoption, adaptation, acceptance, routine, and infusion. They proposed a list of 22 CSFs. Each of the CSFs is thought to have an impact on ERP implementations.

A list of CSFs by prior researchers is summarised in Figure 1 below.

Figure 1. Critical Success Factors in ERP systems from Literature



Successfully implementing ERP the first time requires a structured methodology that is strategy, people, and process focused (Umble & Umble, 2002). The major critical success factor for ERP implementation was top management support and involvement. Other factors relevant to a successful implementation are managing change, having a clear understanding of the objectives ERP is to serve in the company, providing adequate training, and reassuring employees of job security.

These findings are consistent with the critical factors identified by Bingi, Sharma, and Godla (1999) who identified 10 critical issues that contribute to the success of an ERP implementation: top management commitment, reengineering, integration, ERP consultants, implementation time, implementation costs, the ERP vendor, selecting the right employees, training employees, and employee morale. Organisations which have these factors present during their implementation are most likely to experience a successful implementation. They are more likely to achieve a return on their investment in a short period of time.

Top Management

In his dissertation, Bradford (2001) stated that one organisation characteristic, top management support was instrumental in explaining ERP implementation success. Top management must take an active role in leading the ERP implementation. The success of a major project like an ERP implementation completely depends on the strong, sustained commitment of top management. This commitment when transferred down through the organisational levels results in an overall organisational commitment (Bingi et al. 1999).

Similarly, Glaser (1999) stated that there must be a demonstrated strong commitment to successfully implementing the new system by showing strong leadership from senior management, limiting the initial scope of the project, and working towards achieving an early success. Leadership support is essential to obtain buy-in from all levels of the organisation, especially since ERP systems, by their nature, generate such widespread organisational change.

Business Process Reengineering (BPR)

The primary objective of BPR is to make organisations more competitive by improving quality, reducing costs, and shortening product development cycles (Guimaraes, 1995). However, the potential problems of BPR are numerous and vary widely. Those problems include employees setbacks, communication barriers between functional areas, lack of leadership and inability to handle personal risk and confrontations properly, strategies formed outside the company's ability to implement term, etc. In turn, the problems result in sinking morale, productivity drops, and distrust of management.

Bingi et al (1999) stated that implementing an ERP system involves reengineering the existing business process to the best business process standard. ERP systems are built on best practices that are followed in the industry.

Information Technology

Given that each sector is confronted with specific environmental constraints, the transfer of IT practices and procedures from the private to the public sector would not occur automatically. This has been confirmed by prior empirical studies showing differences between private and public organisations with regard to IT management (Bretschneider, 1990; Newcomer and Caudle, 1991; Cats-Baril and Thompson, 1995; Danziger and Andersen, 2002). Bajjal (1999), believes private and public organisations may have the same needs with regard to information management and the same potential for the strategic application of IT

E-government has raised operational, functional and strategic issues in relation to the transformation of public organisations and their implementation of new technologies (Rondeau, Croteau and Luc, 2005). ERP serves as an information backbone for a company's core business processes (Forger, 2000; Campbell, 2000).

ERP Planning Software

Enterprise Resource Planning software had its beginning in manufacturing resource planning software (MRPI). This software later evolved into MRPII. In the early 1990s, MRPII evolved into two systems and directions: Customer Oriented Manufacturing Management Systems (COMMS), and Enterprise Resource Planning (ERP) (Kilian, 2001).

Figure 2. An overview of ERP system
(Source: Sheu et al, 2003)

The primary goal of ERP is to improve and increase information flow within an organisation (Norris, Hurley, Hartley, Dunleavy, & Balls, 2000). Also, ERP software standardises information within the organisation. This streamlines the data flow between different parts of a business (Lieber, 1995). Minahan (1998) stated "ERP gives all users a single, real-time view of their company's available resources and commitments" (p. 113).

ERP Integration

ERP must be fully integrated into daily business operations in order for an organisation to realise the full benefits. If enterprise integration is to have any chance of complete success, it will be due, to a large extent, to the removal of traditional cross-functional barriers (Donovan, 2001).

According to Bingi et al. (1999), with tight integration, companies must also be aware of the potential risks of the errors. Organisations should have mandatory training classes to educate employees about how transactions flow through the system and how errors affect the activities and departments within the organisation. If inaccurate data is

entered into the common database, the erroneous data may have a negative domino effect throughout the enterprise. Inaccurate data can lead to errors in payroll and materials management. If a company with inaccurate data just forges ahead under the assumption that data errors will be corrected when they are spotted, the ERP will lose credibility (Umble & Umble, 2002).

ERP Vendors

According to Bingi et al. (1999), selecting a suitable ERP vendor is extremely important in a successful implementation. Many small ERP vendors are being acquired and merged with larger vendors.

Since ERP systems force customers to re-engineer their current business practices to fit the ERP model, selecting the wrong ERP vendor could result in an unwilling commitment to architecture and applications that do not fit the organisation's strategic goals (Hecht, 1997).

Shepherd (2000) stated that there is a widespread perception that companies are no longer buying and implementing ERP systems and that ERP vendors like SAP are in trouble. However, SAP has been projected to remain the market leader in enterprise applications and substantially increase its share in the supply chain management, customer relationship management, and e-business markets (Gaboury, 1998).

Employee Morale

Employees working on an ERP implementation project work long hours. The stress of implementation coupled with regular job duties could decrease their morale. Leadership from upper management and support of project leaders should seek to boost the morale of these team members (Bingi et al., 1999).

People may be fearful of changes brought about by any new system. They may fear that the new system will make their jobs more difficult, reduce their importance, or even cost them their jobs. Subsequently, ERP systems may create a great deal of uncertainty in some people as to whether or not they will be able to perform their jobs as well as they did under the old system. Some staff may also be uncomfortable with the realisation that with better information, upper management can keep better track of what they are doing and the money they are spending (Umble & Umble 2002).

Employees can become intimidated by the new ERP software. These kinds of changes are marked by resistance, confusion, redundancies, and errors, unless managed properly (Appleton, 1997).

ERP Implementation Failure Factors

"While systematic knowledge about ERP success factors continues to grow, so too does the overall level of confusion about the practicality of ERP because success stories are matched or exceeded by incidents of failure" (Buckhout as cited in Miranda, 1999, p.1). In a recent survey cited in Umble and Umble (2002), information technology managers identified three primary reasons for the failure of all information technology projects: poor planning or poor management (cited by 77%); change in business goals during the project (75%); and lack of business management support (73%). Other statistics show that more than 70% of ERP implementations fail to meet stated objectives (Brown, 2001, Buckhout, Frey and Nemec, 1999).

According to Donovan (1999), the idea that ERP implementation is strictly a technology project because software is involved is wrong; and, in fact, is one of the leading causes of ERP failure. Systems driven implementations are more likely to fail. If the implementation is treated as simply an information technology project, the ERP system will never realise its full capabilities. Umble and Umble (2002) have stated that "successful implementations are typically headed by an individual outside the IT department" (p. 4).

In a study by The Conference Board, survey results indicated that 40% of study participants failed to achieve their business case a year after having implemented ERP. The study also showed that it took six months longer than expected to achieve the company's business case because of pressure to go live (*Enterprise resource implementation still tough, 2001*). Donovan (2001) found that five consistent reasons for poor results in ERP implementations:

1. Operating strategy did not drive business process design and deployment.
2. The implementation took much longer than expected.
3. Pre-implementation preparation activities were done poorly if at all.
4. People were not well-prepared to accept and operate the new system.
5. The cost to implement was much greater than anticipated.

Active risk management

Risks are inherent in projects (Gray and Larson, 2000). According to O'Leary, ERP implementation risks can be categorised as technical, business or organisational. Furthermore, risks from each category appear throughout the entire project, from making a decision to going live (O'Leary, 2000). Because of this, risk management really should cover all five problem areas of project management. Having a concrete action plans beforehand is important to mitigate risks (Kulik, 1997). Active risk management is also required because risks change constantly (Welti, 1999).

Tight project controls on schedule and scope

Project controls are the heart of project management (Gray and Larson, 2000). A formal process is especially critical in a large project such as ERP implementation. Frequent updates of project status and progress allow for timely corrections and keep the project on track (Somers and Nelson, 2001). Tightly controlled project scope and time reduce ERP implementation cost (Gray and Larson, 2000).

Capable and committed project team members

Another key element of a project organisation is competent project team members (Somers and Nelson, 2001). Capable project members can understand and explain new concepts and processes better, in addition to satisfying the technical requirements of the project (Willcocks and Sykes, 2000). Meanwhile, commitment from project members, especially insight and focus, will reduce implementation time and enhance project quality (Brown and Vessey, 1999).

Good external consultants

While they may seem expensive (Brown, 2001), external consultants possess a great deal of specialised knowledge about the ERP system (Welti, 1999). They also bring along a lot of implementation experience. Therefore, having good external consultants on the project team can help solve technical problems quickly, resulting in shortened implementation time and higher quality (Somers and Nelson, 2001).

Smooth and tactful transition management

A carefully planned transition, such as a phased implementation and parallel operations (simultaneous processing in the current and the new systems), increases the probability

of success (Sweat, 1999; Martin and Sara, 2001). Change management in ERP implementations is a big subject that is not covered within the limited scope of this paper. However, it's important to bear in mind that organisational changes due to ERP implementations can be both evolutionary and revolutionary (Boudreau, 1999). The implication of change and transition to project management is the impact on project quality, time and cost.

Properly timed and managed process changes

In ERP implementations, changes can be made to either business processes or the software. Scavo points out, that modifications to ERP software are not only costly, but also time-consuming (Scavo, 1998). On the other hand, Bonerjee cautioned against extensive business process re-engineering (BPR) before going live because of the same reasons (Bonerjee, 2001). Another argument for doing BPR after project implementation is that system users will have much better understanding of functionality and the potential of the ERP software (Wolti, 1999). A complete analysis by O'Leary asserts that the combination of process and software changes plays an important role in determining ERP implementation success, where the highest probability of success exists when there is minimal need to change the process and software (O'Leary, 2000). This conclusion is supported by the ERP implementations at IBM and Microsoft where the implementers discovered that the best approach involves striking the right balance between changing processes and customizing software (Plotkin, 1999; O'Leary, 2000). The extent and timing of process changes affect time, cost and quality of the project.

Adequate project planning

A project plan serves as a guide for the implementation (Bucker, Inc., n.d.). In addition to the actual details of the plan, such as mission statement, scope, operating plan, critical path analysis, etc., the project plan establishes the expectations for how the project should be completed (Donovan, 1999). Consequently, ERP project planning impacts these two problem areas: scope and expectations.

User involvement

If the employees who are not on the project team are excluded from the entire ERP implementation process, they may resist or fear the new system (Mendel, 1999). On the other hand, involved users are not only more motivated to adopt the new system, but

they can also help identify and resolve potential issues early, thereby improving implementation quality (Brown, 2001). As they try out the system, user expectations can be better gauged and met during implementation.

Appropriate and timely training

According to McAlary, "successful ERP implementation depends on successful training" (McAlary, 1999). Training teaches new skills, which makes employees feel more confident and more enthusiastic about the possibilities with the new system (Plotkin, 1999). Appropriate timing for training varies by company. The key is to balance the needs of current work and the new system (O'Lemy, 2000). Like user involvement, training helps to improve quality of ERP project results and to meet user expectations.

Clear and measurable project objectives

Having clear project objectives is critical to the entire project, especially at the beginning (Somers and Nelson, 2001). These objectives are referred to as scope in project management (Gray and Larson, 2000). This helps the project team maintain focus by minimising scope creep, which means going beyond the defined tasks of the project (Scavo, 1995).

Open communication to the entire company

In ERP projects, companies that pay particular attention to educating employees and communicating future changes to the entire company tend to have much better chance of achieving project success (Bucker, Inc., n.d.). For a cross- functional system such as ERP to work, users from all departments must feel that they know and own the system (Scavo, 1995). This prerequisite has a direct impact on the user expectations of the ERP system. Although a number of these prerequisites can be categorised into other disciplines, such as change management, the above analysis reveals that project management concepts play an important role in the success of ERP implementations.

Information Systems (IS) Success model

DeLone and McLean (1992) developed a model which consisted of six fields, including system quality, information quality, use, user satisfaction, individual impact, and organisation impact. This model focused on the quality of the information system. However, users require satisfaction in the service, too. Pitt et al., (1995) thought that the

service perspective favours the information systems vendor. The service quality construct was then added to the ERP success model. The extended model of IS success is displayed in Figure 3.

Figure 3. Extended model of IS success (Pitt et al., 1995)

ERP Project success

The aim of ERP projects is the automation of many basic processes, but these are very complex and very expensive. ERP projects represent significant investment in Information Technology (IT). Teltumbde (2000) evaluated the ERP project in terms of seven domains: creation of organisational infrastructure, constitution of the repertoire of ERP products, preparation phase, context setting phase, evaluation and selection, approval of the selection, and mid-course evaluation.

Hong and Kim (2002) suggested that implementation success should be investigated from the negative side. They focused on the project perspective of implementing an ERP system. An instrument was developed to measure the time and money wasted or business competitive advantages lost.

Conceptual Research Model

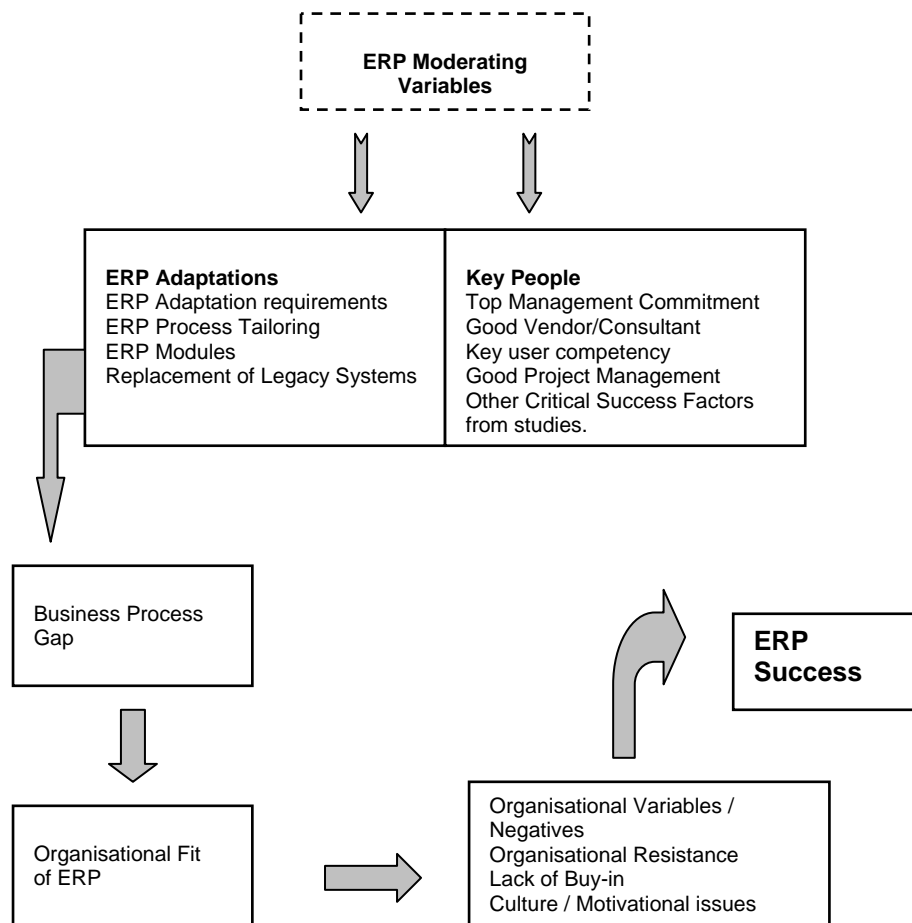


Figure 4. Conceptual Research Model

The conceptual research model consists of six key areas. This research takes various elements from a number of traditional models produced by previous researchers identified in the literature review in relation to CSF's in relation to successful implementation of ERP.

In particular, I refer to the model developed by DeLone and McLean (1992) which consisted of six fields, including system quality, information quality, use, user satisfaction, individual impact, and organisation impact. This model focused on the quality of the information system. This table was extended and used by Pitt et al., (1995), by adding the service quality construct to the ERP success model. The extended model of IS success is displayed in Figure 4 in the literature review. This model has been adapted to produce the conceptual research model for this study.

The research model is the key element guiding this study through the investigation, literature review, the development and design of the research questionnaire and the analysis and recommendations of the study. The fields included within the questionnaire link directly to previous research as identified in the literature and serves to extend previous studies in a tangible manner.

Critical Review of Literature

It is apparent from the review of literature that many factors contribute to a successful ERP implementation. Most of the researchers agreed on the benefits of ERP systems and the critical factors necessary for a successful implementation. In addition, researchers agreed that the absence of the critical factors and the failure to properly prepare for the ERP implementation can contribute to the failure of an ERP software implementation. With regard to the benefits sought through implementation, researchers agreed that ERP software allows for increased communication within an organisation.

In regard to critical factors for a successful implementation, researchers consistently cited top management support as the most critical factor for successful implementation (Bingi et al. 1999). The research indicated that project managers must carefully monitor implementation activities to ensure that the critical factors are present during the ERP implementation. Monitoring and remaining cognisant of these factors may increase the chances of successful ERP implementation.

ERP implementation in the public sector has been limited due to the high cost of implementation. However, some public sector organisations have successfully implemented ERP software. Many of the factors that are required for successful implementation in the private sector are also required in the public sector. Also, many of the public sector organisations implement ERP software seeking the same benefits as private sector companies. However, managing the critical factors during the implementation in the public sector may be more difficult because of the increased government regulation and public accountability.

Within the main body of the literature review, many elements of ERP have been considered and discussed. It would appear that most research is orientated around critical success factors, with few or not enough considering the critical elements relating to failure of ERP Projects.

Different ERP implementation phases are associated with specific ERP implementation problems (Markus et al., 2000) however there still appears to be a lack of research in literature with regard to the investigation of failure factors of ERP implementation from planning to post ERP implementation

Several researchers (Markus et al., 2000; Parr and Shanks, 2000) suggest that an ERP implementation project is best considered to be a business project rather than the installation of new software technology. However, the very fact that implementation of ERP is a commercial enterprise, vendors will not be interested in the reporting of failed ERP projects.

In Markus et al., (2000) model the chartering phase begins before Bancroft et al.'s (1998) focus and Ross' (1998) design phases. It includes the development of the business case for the ERP, package selection, identification of the project manager, and budget and schedule approval. The description of their project phase is similar to Ross' (1998) project phase and it covers four of Bancroft et al.'s (1998) phases (as is, to be, construction and testing and actual implementation). The main activities of Ross' (1998) project phase are: software configuration; system integration; testing and data conversion; training and roll-out (Markus et al., 2000). Their onward and upwards phase is essentially a synthesis of Ross' (1998) continuous improvement and stabilisation phases.

There are several points of interests with these three models. Firstly, Markus et al. (2000) and Ross (1998) include a planning phase which occurs prior to the actual implementation project. Secondly, these two models collapse the actual implementation project into one discrete unit. In contrast, Bancroft et al. (1998) categorised the stages of the actual project into four project sub- phases. Thirdly, two of the models (Ross, 1998; Markus et al., 2000) include a post project phase (which are referred to as either continuous improvement, transformation, or onward and upwards) in the model of the whole ERP implementation enterprise. None of them relate critical success factors or critical failure factors to the phases of implementation.

As a comparison of the studies, Markus et al.'s (2000) model could be adopted, but would benefit from some method to measure failure and identify failure factors. This model is flexible and includes detailed activities and problems associated in each phase (starting from planning to post- implementation). It would be useful to ask participants to conclude their critical failure factors after reviewing the whole implementation process and the associated problems in each phase of ERP life cycle or as a general summary as in the case of this research project.

Many researchers have discussed CSF's and have researched these using various frameworks. Figure 1 provided a summary of CSF's derived from prior research by Hong and Kim (2002), Umble et al. (2003) Davenport (1996), Bancroft et al, (1998), Parr et al. (1999) Nah et al. (2001), Somers and Nelson (2001) and Al-Mashari et al. (2003). Although this is only a small sample of work in this field, none of the researchers appear to have considered the importance of accurate process mapping or benchmarking of the existing organisation prior to commencement of the implementation of and ERP project.

Summary

It is clear that researchers follow in each others footsteps to research the same areas in slightly different ways. Critical success factors appear to lead, with a distinct lack of research being undertaken to cover failure factors.

Researchers often introduce their thesis by explaining to whom and why the research will be useful. A suggestion for future research would be for potential researchers to try to determine when a project is to be commenced. This may be an opportunity to see a live implementation for the first time and to provide a golden opportunity to undertake a study in 'real time'.

From personal involvement in ERP implementation, I suggest that the focus of many researchers will be redirected from CSF's previously researched, to include process mapping, benchmarking existing systems and monitoring progress etc in far more detail. This really is where the project commences and begins to fail immediately. What happens after that is 'fire fighting', low morale and increased costs, as the incentive is to "GO Live" on the date set by the vendor.

CHAPTER 3

METHODOLOGY

Introduction

Underpinning any research project is the paradigm that is applied to the research. Guba and Lincoln (1994:105) argue that questions of research methods are of secondary importance to questions of which paradigm is applicable to the research. There are many underlying issues that need to be considered – this process is depicted by Saunders et al (2009) Research Onion, representing the layers that need to be ‘peeled away’.

Research Philosophy

The research philosophy adopted by the researcher is used to guide the project, and contains important assumptions about the way in which one views the world. It will be in part influenced by the practical considerations, but mainly by the researchers view of the relationship between knowledge and the way in which it is developed (Saunders et al 2009).

For this research project, we take a **Subjective approach**. Saunders et al (2009) suggest this may be more appropriate for the study of management because of the social interactions and interpretations that occur within organisations.

Furthermore, this research has adopted a ‘Realism’ approach, in that it recognises that the research is somewhat subjective and therefore difficult to measure. We can however, put the issue to be studied into different categories, and give them labels.

The ‘Realism’ philosophy looks for an association between variables, and tries to establish a chain of cause and effect, by breaking down a problem into constituent parts. The relationship between these parts, are studied to identify recurrent patterns and associations. These patterns are then used to establish principles or laws that can be used to select possible solutions to the problem (Fisher 2007).

Realists such as Miles and Huberman (1994:5) want to discover the mechanisms that lead to events and aim to formulate theories that can be verified and generalised. They

often use qualitative methods but will also add quantification to these methods. However, because much of this research is subjective, analysis can only be provisional and will be tested by further research.

This research combined questionnaires (quantitative) to identify the presence of certain factors and Open Ended questions (qualitative) to provide a deeper understanding of the issues involved.

As the researcher works for the organisation being studied, his researcher role was that of 'Judge', a privileged observer. This, according to Fisher (2007) has the advantage of being "open and honest," giving those being studied the chance to put their point of view to the researcher. This disadvantage with this role is that those being studied may become uneasy and modify what they say and how they behave.

Research Approach

There are two main research approaches that can be used when designing the research: Deductive – a theory and hypothesis is proposed and the research strategy aims to test the hypothesis.

Inductive – data is collected and a theory is developed based on the analysis of the data.

This study adopts an Inductive approach. One of the key strengths of this approach is that it enables us to develop an understanding of how humans attach meaning to events. It also allows for flexibility in the structure of the research to permit changes of research emphasis as the research progresses, and enables the researcher to understand why something is happening rather than describing what is happening.

Research Strategy and Design

In formulating my research strategy and design, I took into account what I am seeking to achieve from my study. There are numerous possible approaches to the research, including experiment, survey, case study, action research, grounded theory, ethnography and archival research. Most of these approaches are not suited to this study. An experimental strategy is not feasible for many management and business research questions, as it is not usually possible to change one variable to produce a change in another independent variable. There may be ethical concerns, and also, it would be very

difficult to control all other variables. Action research, grounded theory, ethnography and archival research are not appropriate for this study.

A case study approach could be used here as it is defined as ‘a strategy for doing research’ which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence (Robson 2002: 178). It is felt however, that the most appropriate strategy for this research is the ‘Survey Strategy’, as it aims to obtain a broad and representative view of the situation being considered.

The use of a survey allows the collection of a large amount of data from a sizeable population in a highly economical way (Saunders et al 2009: 144). This data can be analysed quantitatively and qualitatively using descriptive and inferential statistics.

Also, it is important when using the survey approach, that the sample population is representative and that the survey instrument is designed well to achieve a good response rate. The potential drawback to using a survey is that it may not be an efficient way to study the complexity of things (phenomena) in particular (Fisher, C., 2007: 59).

Research Design

The main survey instrument used is a Questionnaire. However, data collected by this process may not be as wide-ranging as those collected from other research strategies, due to the limit and number of questions that can reasonably be used. To counteract this, the research utilised an ‘Open Questionnaire’ style instrument. This provided appropriate questions and provided sufficient space for people to respond in their own words.

Data Collection and Analysis

Population

The sampling frame for this study consisted of staff at all levels throughout the organisation: ERP implementation project managers; ERP implementation change managers; EROP implementation change agents and randomly selected team members from an internal telephone directory. Sampling was used because of the practicalities involved in surveying the entire population. I was restricted primarily by the time

required to undertake the survey, seek responses analyse data from the entire population.

Sampling procedure

In addition to being more practical to survey a sample of the population, many researchers, for example Henry (1990) argues that sampling makes possible a higher overall accuracy than a census. The smaller number of cases means that you can collect more detailed data, and spend more time checking and testing the data prior to analysis.

There are two techniques available when selecting a sample;

- Probability or Representative sampling;
- Non- probability or Judgemental sampling.

With probability sampling, the probability of each case being selected from the population is known and is usually equal for all cases (Saunders et al 2009: 213). Non-probability sampling provides a range of alternative techniques to select samples based on your subjective judgement. Non-probability sampling was used for this study, and cases were selected using Purposive sampling to ensure that the participants were best suited to answer the research questions and meet the research objectives. Lastly, Critical Case sampling was used. This means that participants were selected on the basis that they can make a point or because they are important (Saunders et al 2009).

Sample Size

The size of the sample used is critical. Too large and it becomes impractical to undertake research within the time frame allowed. Too small and the sample is not representative. The important issue is that we are able to gain information rich data which is meaningful and credible. A sample size of a hundred was decided upon as it was considered to be a manageable number but sufficient to provide rich, representative data. Eight participants failed to return the questionnaire. Therefore, an additional eight participants were selected from a staff at a comparable level within the organisation. In total, data from a sample size of 100 participants was used. The number of participants chosen from each level within the organisation reflected proportionally the total number at each level (similar to the quota sampling method but on a smaller scale).

Primary Data

This study aims to produce a combination of quantitative and qualitative data. The survey instrument used is a questionnaire. Questionnaires are usually used to obtain standardised data by asking questions that will be interpreted in the same way by all respondents (Robson 2002). Questionnaires are well suited for descriptive research such as that undertaken using attitude and opinion questionnaires which will enable you to identify and describe the variability in different phenomena (Saunders 2009: 362). This research also aims to produce exploratory data. Therefore, open questions have been used within the questionnaire to allow respondents to give answers in their own way (Fink 2003 a). This also allows new ideas to emerge from the research which can form part of the analysis and recommendations. The type of questionnaire used was a self administered type which was sent via email, completed by the respondent and returned by email.

The main body of the questionnaire was designed as a matrix, or grid of questions. This saves space, however Dillman 2007 suggests that respondents may have difficulty comprehending these designs and that they may be a barrier to response. To counteract this, there was space alongside each question to allow respondents to make comments.

The questions used were designed with reference to the review of literature relating to the ERP implementation. Suggestions on the content, clarity and appearance of the instrument were made based on feedback from a sample of senior management.

Ethical Considerations

It is important to consider ethical issues during data collection and analysis, relating to the

- Privacy of participants
- Voluntary nature of participation
- Consent and possible deception of participants
- Maintenance of confidentiality of data and anonymity of respondents
- Reactions of participants to the way in which data is collected, analysed and reported
- Behaviour and objectivity of the researcher (Saunders 2009: 185)

The privacy of respondents was ensured by assigning a unique survey code to each questionnaire. The identity of the organisation and of the respondents has been omitted from the data analysis to protect identities.

Data Analysis

When analysing the data collected, the aim was to find answers to the research questions. Qualitative data in its raw form is meaningless to most people. It needs to be processed to produce useful information. Miles and Huberman (1994) present the following parallel flows of activity to explain the process of data analysis.

Figure 5. Components of Data Analysis: Interactive Mode **(Miles and Huberman 1994).**

- Data Reduction: The process of selecting, focusing, simplifying, abstracting and transforming the data.
- Data Display: Displaying the reduced data in an organised way so that conclusions can be more easily drawn.
- Conclusions – Drawing/Verifying: Interpreting the data.

There are many techniques that can be used to analyse data. They range from simple tables or diagrams that show the frequency of occurrence and using statistics such as

indices to enable comparisons, through establishing statistical relationships between variables to complex statistical modelling (Saunders et.al. 2009: 414).

The quantitative data collected in this research ‘Categorical Data’ meaning that it cannot be measured numerically, can either be classified into sets (categories) according to the characteristics that describe the variables or placed in rank order (Berman, Brown and Saunders 2008).

The data in this research have been presented in the form of tables and bar charts (data reordered in highest-lowest frequency order). In addition research questions 2, 3 and 4 have been assigned a Likert-style Scale from which we were able to calculate the mean values.

CHAPTER 4

ANALYSIS OF DATA

Introduction

The purpose of this study was to determine the following: (a) the benefits sought from implementing ERP; (b) the extent to which critical factors were present during the ERP software implementation; (c) the level of satisfaction with the performance of implemented modules among the project managers and team members; (d) the perceptions of project managers and team members and concerns of implementing ERP.

Research Question 1

Did ERP implementation realise the intended benefits?

The results illustrated in Table 1 and Graph 2, provide the frequencies of responses for each of the stated benefits. The benefits were split and grouped into the following three tables;

Table 1. Information Reporting

Table 2. Business Processes

Table 3. Financial Benefits

The average score was calculated for each of these categories.

Information was also illustrated graphically.

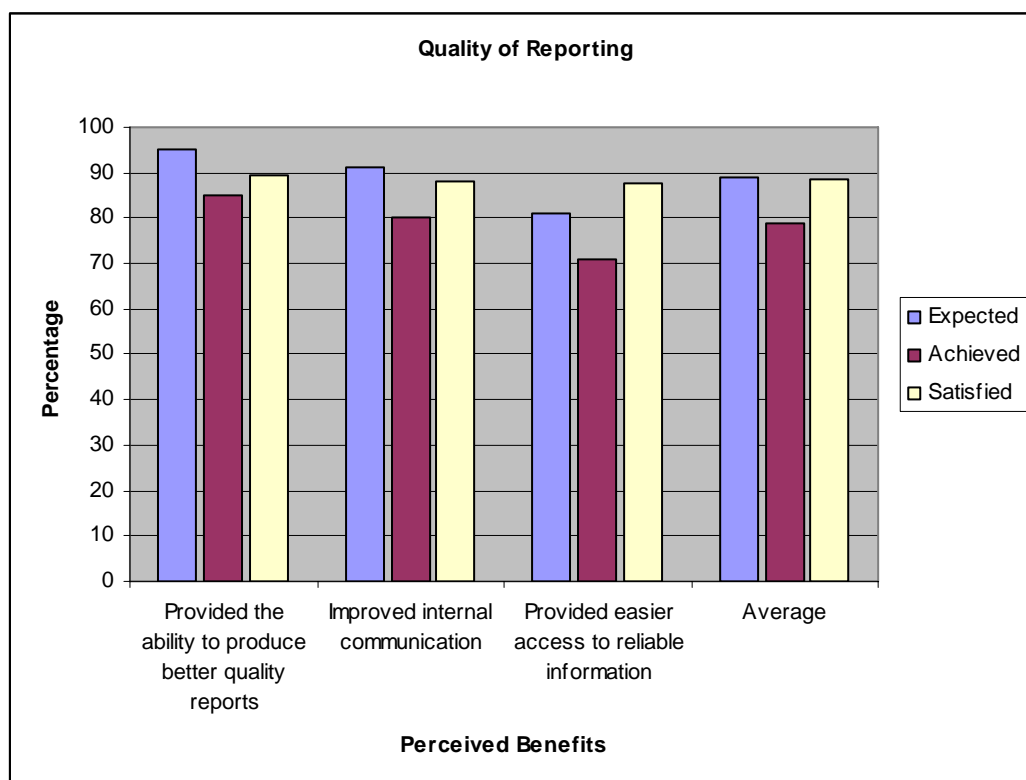
Part 1.1 Survey Data Summary

Perceived Benefits following implementation of ERP

Table 1. Quality of Information

Item	Quality of Information	Expected %	Achieved %	Satisfied %
1	Provided the ability to produce better quality reports	95	85	89.5
2	Improved internal communication	91	80	87.9
3	Provided easier access to reliable information	81	71	87.6
	Average	89	78.7	88.4

Graph 1. Quality of Information



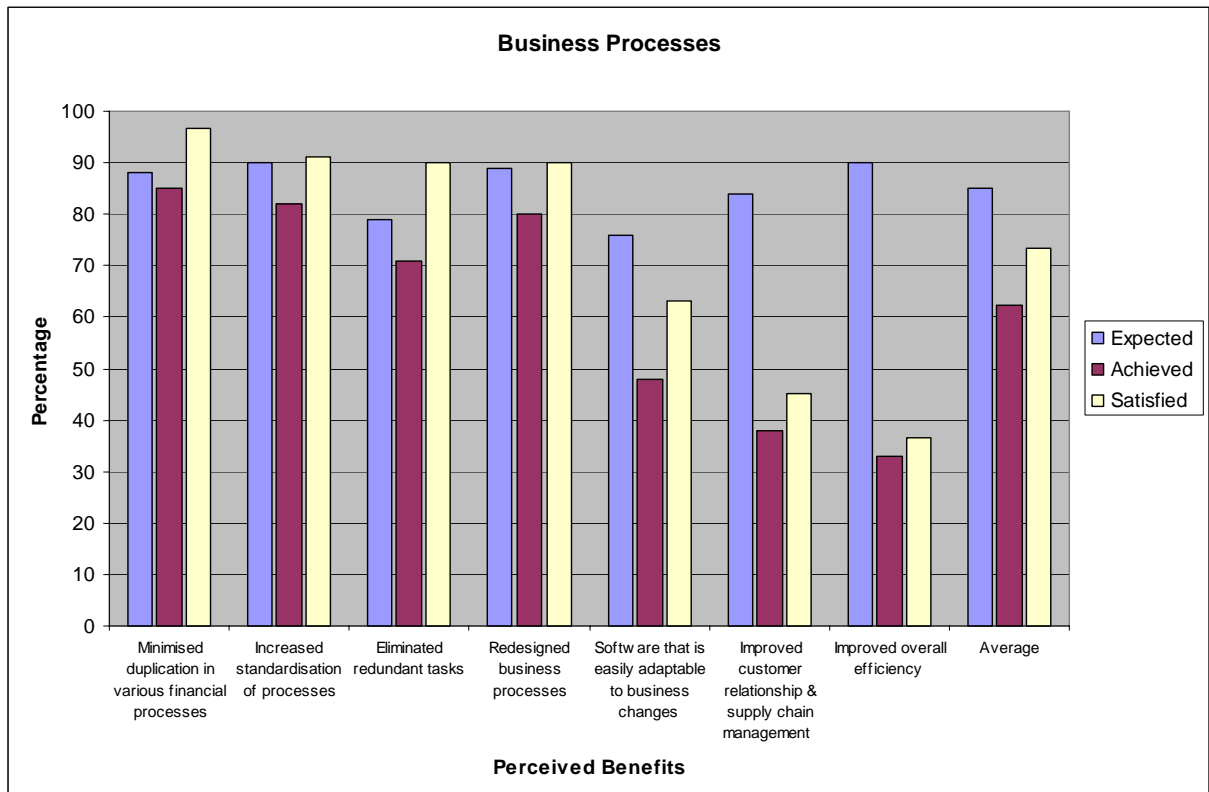
Part 1.2 Survey Data Summary

Perceived Benefits following implementation of ERP

Table 2. Business Processes

Item	Business Processes	Expected %	Achieved %	Satisfied %
1	Minimised duplication in various financial processes	88	85	96.6
2	Increased standardisation of processes	90	82	91.1
3	Eliminated redundant tasks	79	71	89.9
4	Redesigned business processes	89	80	89.9
5	Software that is easily adaptable to business changes	76	48	63.2
6	Improved customer relationship and supply chain management	84	38	45.2
7	Improved overall efficiency	90	33	36.7
	Average	85.1	62.4	73.4

Graph 2. Business Processes



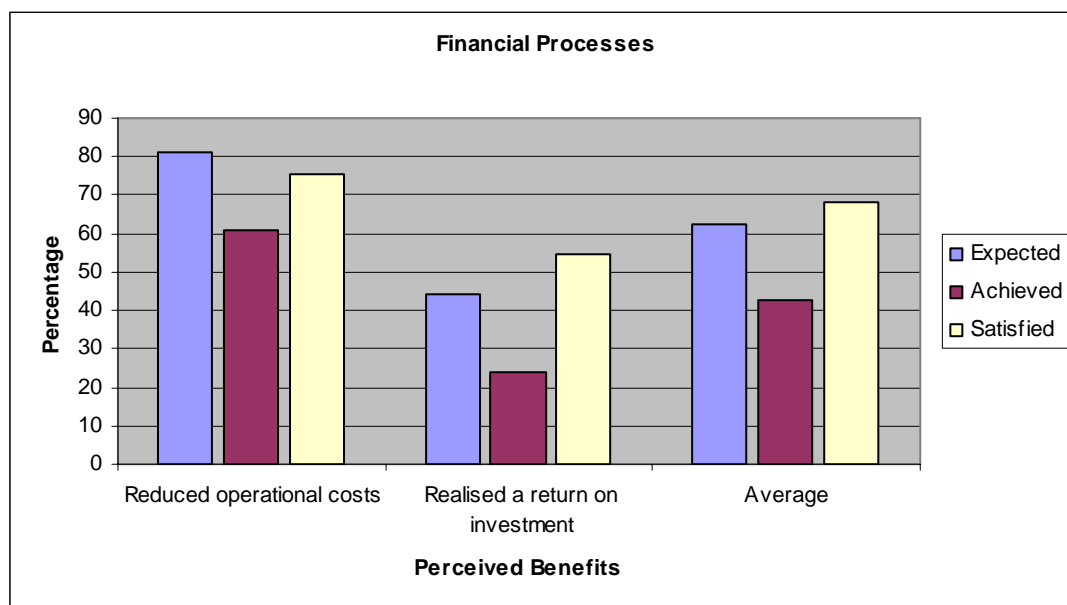
Part 1.3 Survey Data Summary

Perceived Benefits following implementation of ERP

Table 3. Financial Processes

Item	Financial Processes	Expected %	Achieved %	Satisfied %
1	Reduced operational costs	81	61	75.3
2	Realised a return on investment	44	24	54.5
	Average	62.5	42.5	68

Graph 3. Financial Processes

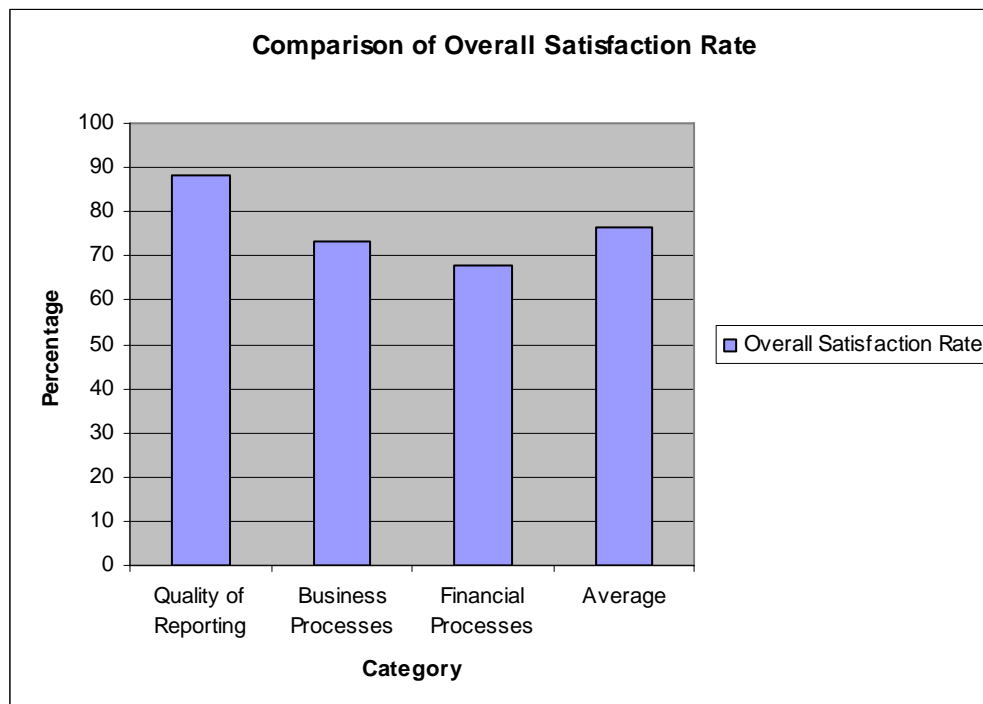


Part 1.4 Survey Data Summary

Table 4. Comparison of Satisfaction Rate for the Various Categories of Perceived Benefits of ERP.

Item	Category	Overall Satisfaction Rate %
1	Quality of Information	88.4
2	Business Processes	73.4
3	Financial Processes	68
	Average	76.6

Graph 4. Comparison of Satisfaction Rate for the Various Categories of Perceived Benefits of ERP.



Analysis

The results of the survey were analysed for the following: number who expected to realise certain improvements; the number who believed they achieved this; percentage of those who expected to achieve that actually achieved (satisfactory rating).

The results of the questionnaire show that the highest number of positive responses was for perceived improvements in quality of information, reporting systems - 89% expected to see this, and 78.7% actually achieved this. This represents an 87.4% satisfaction rate.

Generally, it would appear that people are relatively satisfied with the Reporting Systems. As all reporting forms are standard in nature, and available from all user terminals, this improves these daily tasks.

Unfortunately, not all respondents are completely happy with the system. This is likely to be due to the fact that some standard forms were not working at “go-live”, and are still not working several months after.

There was a similar high number of positive responses overall for the improvement in Business Processes. (85.1% expected, 73.4% achieved) This shows a satisfaction rate of 89.3%. The highest number of positive responses was for minimising duplication in various financial processes (88% expected, 85% achieved). This shows a 96.6% Satisfaction rate.

A total of 84% of participants expected to benefit from improvements in Supply Chain Management. 38% achieved this. This shows a 45.2% Satisfaction rate.

In addition, almost 89% expected to see Redesigned Business Processes. 80% achieved this. This represents an 89.9 % Satisfaction rate. 79% of participants expected to see Redundant Tasks eliminated. 71% of participants felt this was achieved. This represents an 89.9% Satisfaction rate.

A similarly high number of respondents expected to achieve increased Standardisation of Business Processes. 82% felt this was achieved. This represents a Satisfaction rate of 91.1%.

Generally, it would appear that people are relatively satisfied with the Standardisation of Business Processes. As all business processes are available from all user terminals, this improves or should improve these daily tasks.

Unfortunately, not all respondents are completely happy with the system. This is likely to be due to the fact that the business processes are the key areas most used by most employees. As part of the BPR, all staff was given additional responsibilities depending on their position in the structure. All were given greater control over purchasing and general financial details.

At “go-live”, some standard forms were not working, the payment system failed, invoice systems failed, supply chain failed and certainly, overall efficiency failed. These systems are still not working efficiently several months after “go-live”.

There were a lower number of positive responses regarding the Financial Benefits questions. 81 % of respondents expected to achieve a Reduction in Operational Costs. 61% of respondents felt this was achieved. This represents a 75.3% Satisfaction rate.

A very low number of positive responses were given for improved overall efficiency, Whilst 90% expected to achieve this, just 33% of respondents actually felt this had been achieved (A satisfaction rate of 36.7%).

The lowest positive response rate was regarding a Return in the Investment element. Just 44% of respondents said they expected improvements. 24% achieved this. This represents a Satisfaction rate of 54.5%. This is probably due to only a small number of respondents actually being involved in the financial field and analysis of the ERP system. Also, I believe that participants may have found it difficult to quantify the Return on Investments.

Research Question 2

To what degree were critical success factors present or considered during ERP implementation?

Survey participants were asked to indicate, based on their experience, to what extent, specified Critical Success Factors were present during implementation of ERP. The results were analysed for frequency of responses. The critical success factors were then grouped into four separate tables;

Table 4. Top Management Involvement

Table 5. Project Implementation

Table 6. Project Management

Table 7. End User Involvement / change management

A Likert Scale was used to calculate the Mean score for each CSF, with Yes = 2, Somewhat = 1, No = 0 and Don't Know – Disregarded.

Information was also illustrated graphically.

Part 2.1 Survey Data Summary

Table 5. Top Management Involvement

Item	Critical Success Factor	Yes %	Somewhat %	No %	Don't Know %
1	The implementation had top management (executive level) support	98	0	0	2
2	Top management was kept abreast of the project status	87	7	0	6
3	The project had the support of business unit managers	69	15	11	5
4	Overall	84.7	7.3	3.7	4.3

Graph 5. Top Management Involvement

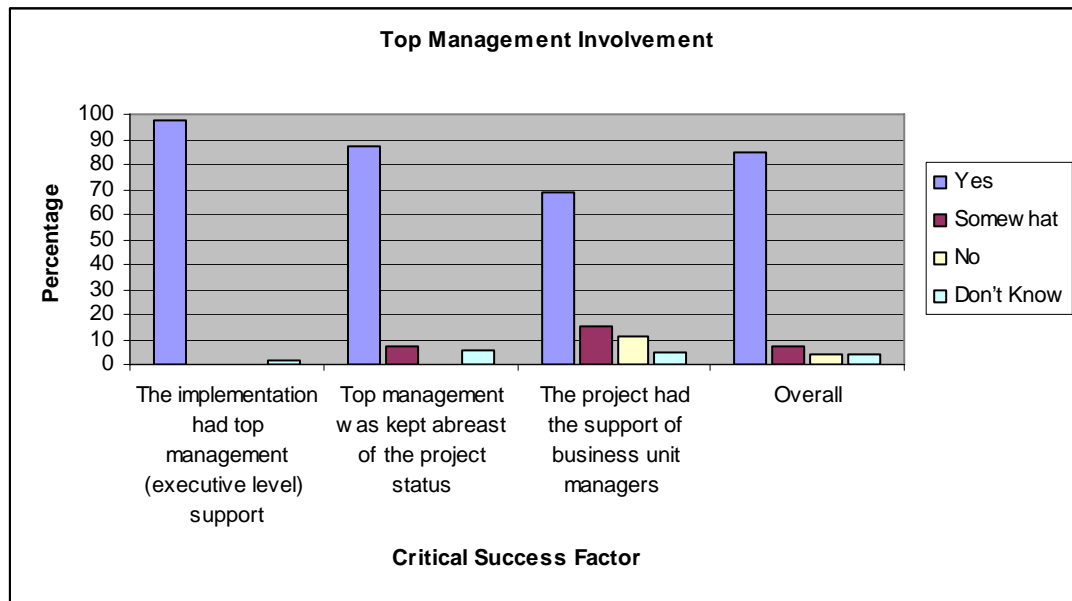
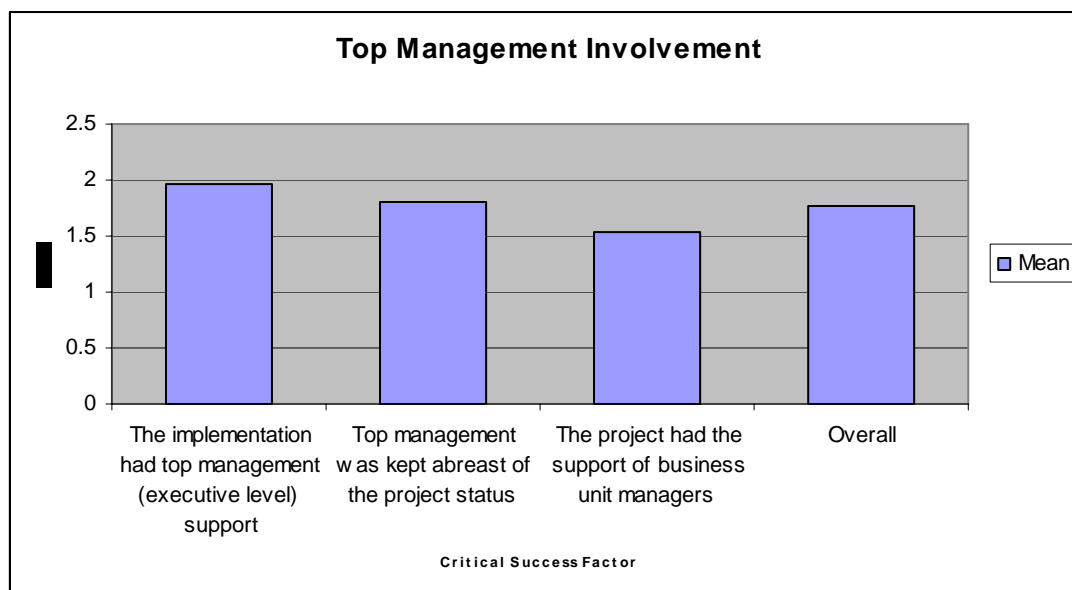


Table 6. Top Management Involvement Mean Values

Item	Critical Success Factor	Mean
1	The implementation had top management (executive level) support	1.96
2	Top management was kept abreast of the project status	1.81
3	The project had the support of business unit managers	1.53
4	Overall	1.77

Graph 6. Top Management Involvement Mean Values



Part 2.2 Survey Data Summary

Table 7. Project Implementation

Item	Critical Success Factor	Yes %	Somewhat %	No %	Don't Know %
1	Our organisation mapped and re engineered our business to match the ERP process	74	19	2	5
2	The ERP software was modified to meet our needs	78	9	4	9
3	There was a clearly defined scope for the implementation of the project	72	11	3	14
4	Overall	74.7	13	3	9.3

Graph 7. Project Implementation

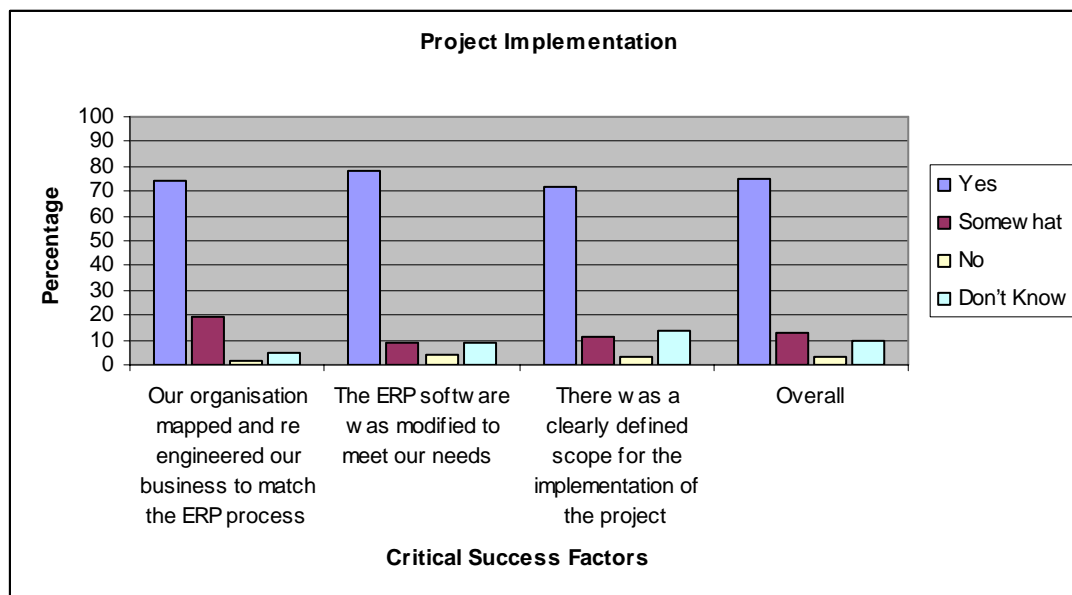
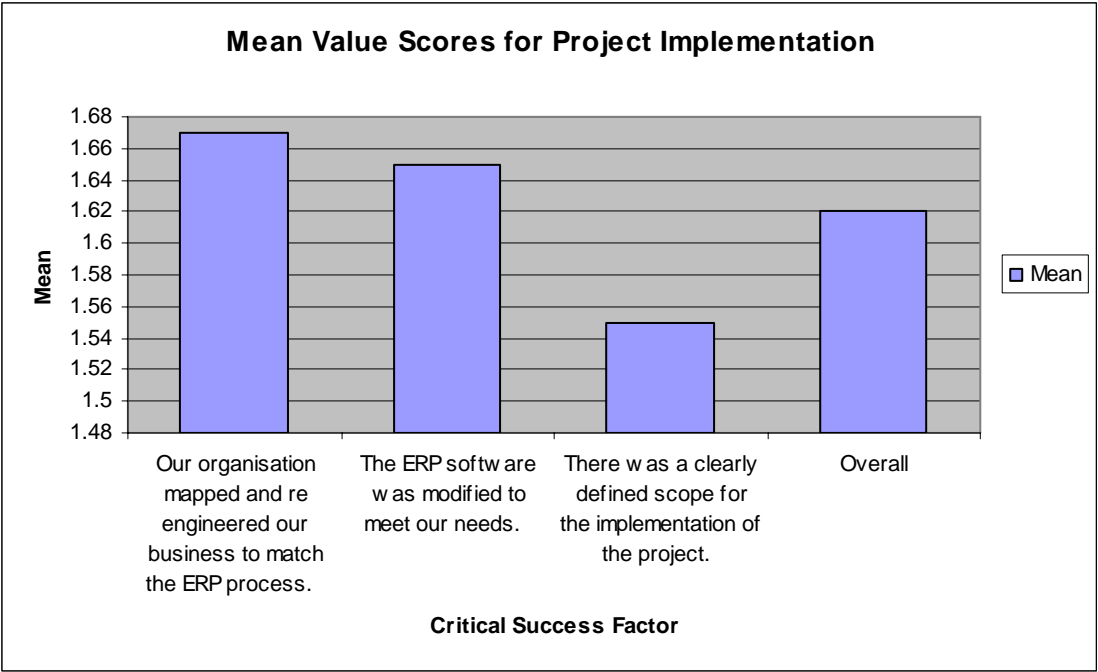


Table 8. Mean Value Scores for Project Implementation of CSFs.

Item	Critical Success Factor	Mean
1	Our organisation mapped and re engineered our business to match the ERP process.	1.67
2	The ERP software was modified to meet our needs.	1.65
3	There was a clearly defined scope for the implementation of the project.	1.55
4	Overall	1.62

Graph 8. Mean Value Scores for Project Implementation of CSFs.



Part 2.3 Survey Data Summary

Table 9. Project Management

Item	Critical Success Factor	Yes %	Somewhat %	No %	Don't Know %
1	The project manager was influential with upper management	77	9	4	10
2	The ERP vendor was involved in our project.	63	21	3	13
3	The project team was knowledgeable about ERP and business processes	51	36	9	4
4	The implementation project manager was skilful in project management	49	22	0	29
5	Overall	60	22	4	14

Graph 9. Project Management

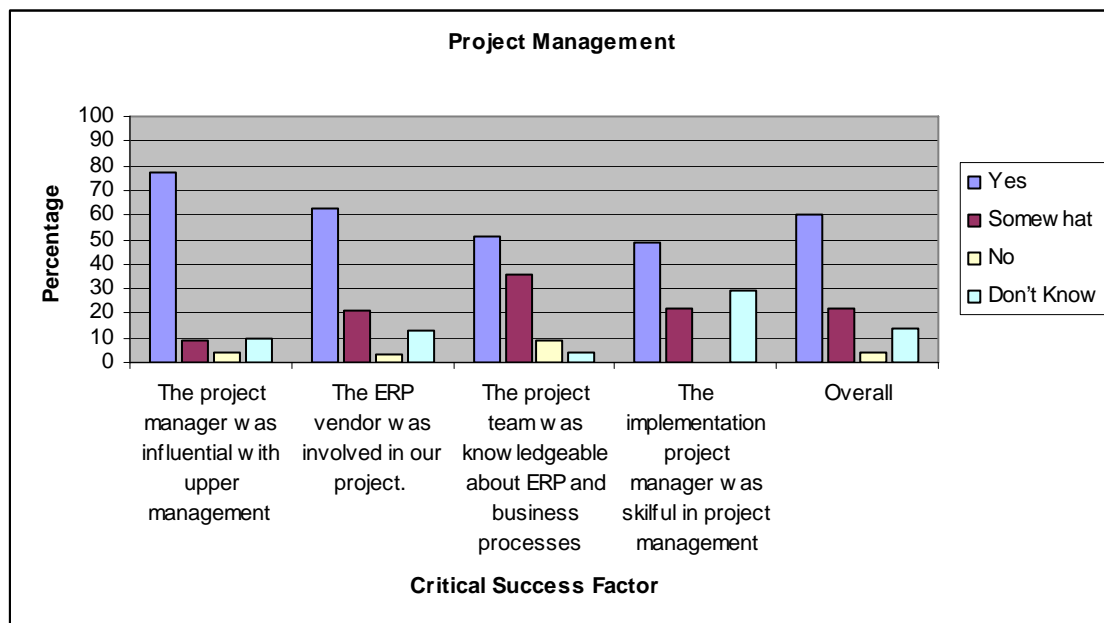
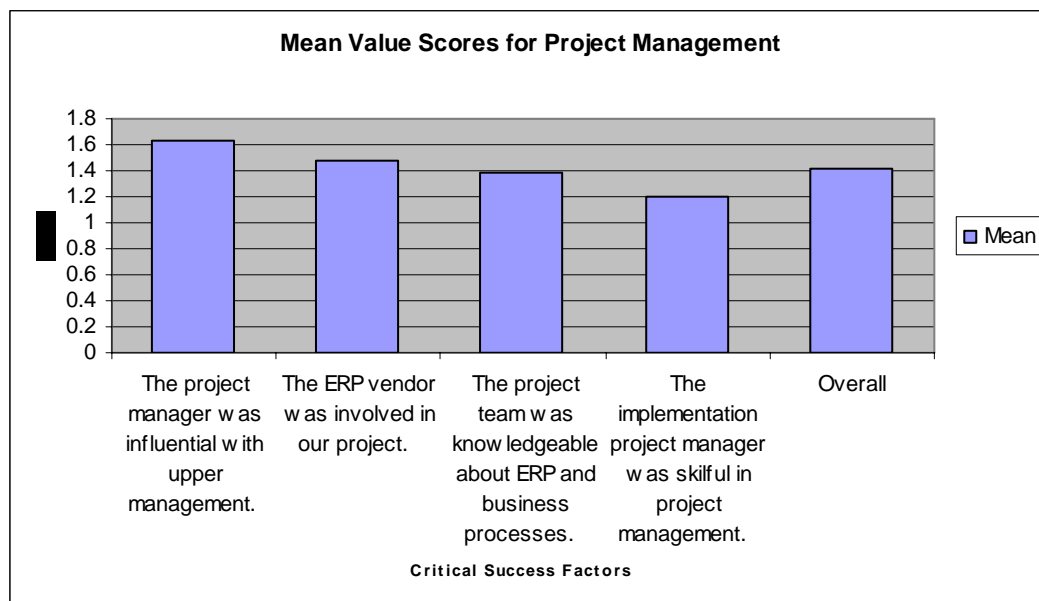


Table 10. Mean Value Scores for Project Management.

Item	Critical Success Factor	Mean
1	The project manager was influential with upper management.	1.63
2	The ERP vendor was involved in our project.	1.47
3	The project team was knowledgeable about ERP and business processes.	1.38
4	The implementation project manager was skilful in project management.	1.2
5	Overall	1.42

Graph 10 Mean Value Scores for Project Management.



Part 2.3 Survey Data Summary

Table 11. End User Involvement / change management

Item	Critical Success Factor	Yes %	Somewhat %	No %	Don't Know %
1	End-users were involved during the implementation	39	43	13	5
2	The organisation was prepared to manage change	38	20	36	6
3	There was effective end-user training	30	26	36	8
4	Overall	35.7	29.7	28.3	6.3

Graph 11. End User Involvement / change management

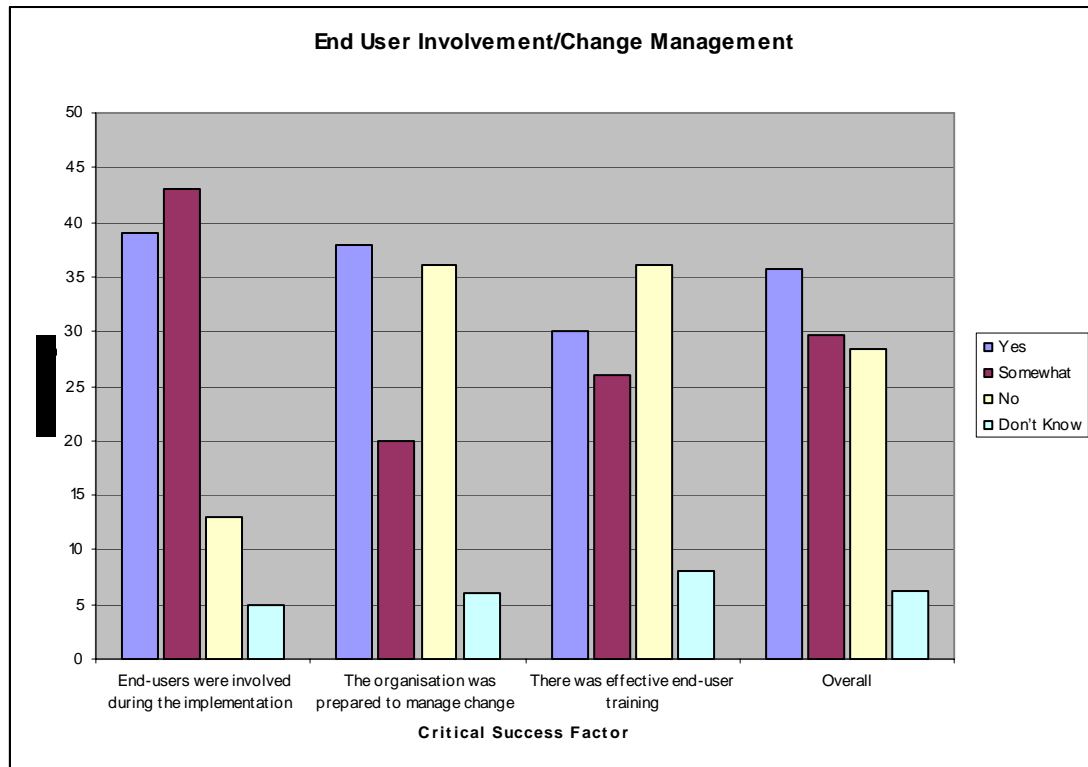


Table 12. Mean Value Scores for end user involvement / Change Management

Item	Critical Success Factor	Mean
1	End-users were involved during the implementation.	1.21
2	The organisation was prepared to manage change.	0.96
3	There was effective end-user training.	0.86
4	Overall	1.01

Graph 12. Mean Value Scores for end user involvement / Change Management

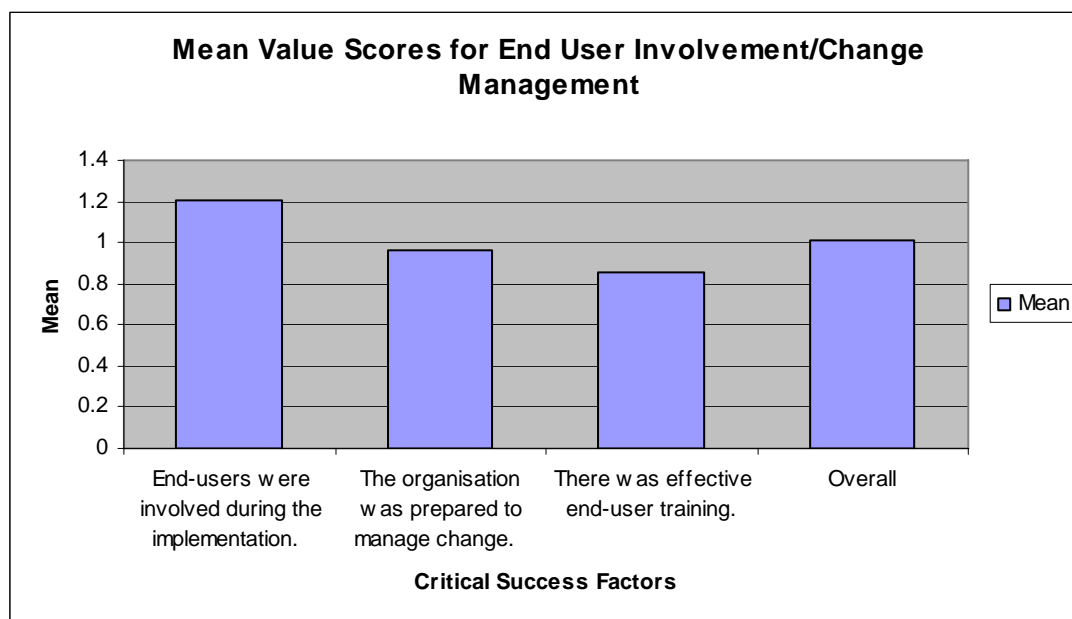
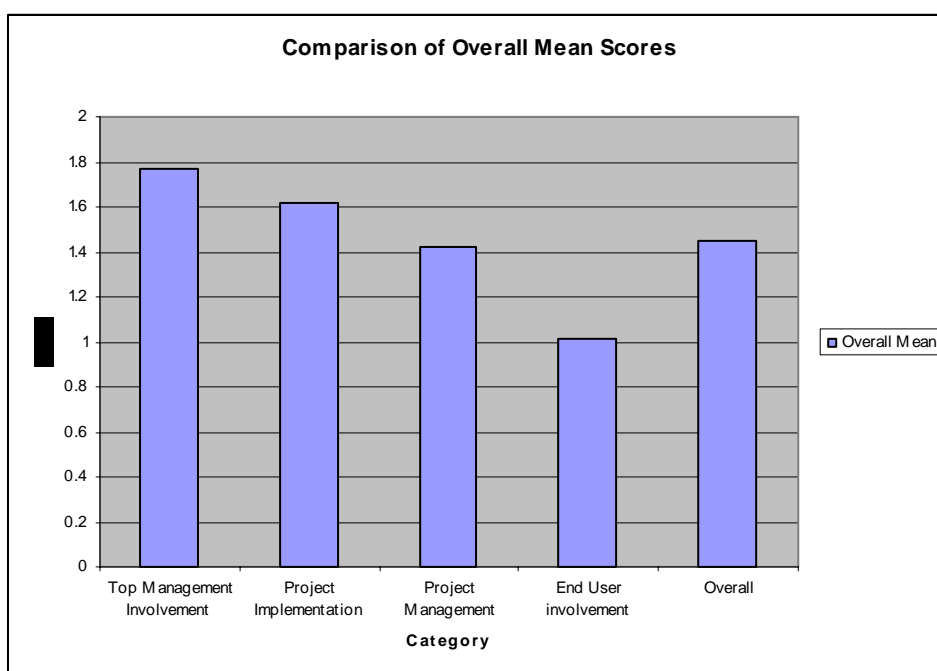


Table 13. Comparison of Overall Mean Scores for Categories of CSF Present During ERP Implementation

Item	Category of Critical Success Factor	Overall Mean
1	Top Management Involvement	1.77
2	Project Implementation	1.62
3	Project Management	1.42
4	End User involvement	1.01
5	Overall	1.45

Graph 13. Comparison of Overall Mean Scores for Categories of CSF Present During ERP Implementation



Analysis

Top Management Involvement

Top management were kept abreast of project status (87% said Yes, and 7% said somewhat). With regard to whether implementation had top management support (98% said Yes. With regard to whether the project had the support of Business Unit Managers (98% said Yes and 15% said Somewhat). The overall Mean for this category is 1.77 indicating that most respondents believe that this CSF was present.

It was clear that during implementation of ERP, top management attended regular meetings with staff at all levels in the organisation. One key element relating to the success of RP implementation cited in literature is good communication at all levels between tom management and staff. All staff was invited to regular meetings, received emails and attended road shows explaining ERP. All respondents would be aware of the reporting and communication network in place.

Project Implementation

A large percentage (74.7% and 13% Somewhat) felt that implementation of the ERP project was successful. With regard to whether there was a clearly defined scope for implementation of ERP, (72% said Yes, and 11% said Somewhat).

With regard to whether the ERP software was modified accurately to meet our needs (78% said Yes and 9% said Somewhat).

With regard to whether the organisation had mapped and re-engineered our business processes to match the ERP processes (74% said Yes and 19% said Somewhat).

The Mean scores were high for all CSFs within this category, ranging from 1.55 to 1.767 (overall 1.62) indicating that respondents generally felt that this CSF was present.

Prior to implementation of ERP, managers and section heads were asked to complete a questionnaire about what they actually do. The form was complicated and ambiguous. In addition, the form was treated as a spying mechanism as all managers were suspicious and may have been protecting the interests of their staff and themselves.

After completion and return of the form, nobody would be in a position to see clearly whether processes had been mapped properly.

This seemed to be a system of process mapping 'on the cheap', instead of a professional team undertaking the exercise properly and accurately.

Project Management

The Project Management element received a reasonably high number of positive responses (60% overall said Yes, and 22% said Somewhat).

With regard to whether respondents felt that the Project Manager was influential with upper management 77% said Yes and 9% said Somewhat.

With regard to whether respondents felt the implementation Project Manager was skilful in Project Management 49% said Yes and 22% said Somewhat).

With regard to whether respondents felt the ERP Implementation Project Team were knowledgeable about ERP and Business Processes (51% said Yes and 36% said Somewhat).

Finally, with regard to whether respondents felt the ERP Vendor was involved in the project (63% said Yes and 21% said Somewhat).

The Mean scores for this category were slightly lower than for the previous categories, ranging from 1.2 to 1.63 (1.42 Overall). This appears to indicate that respondents felt that the CSFs were present but to a lesser degree.

Although many people had no involvement in the implementation of ERP, all were instructed to attend certain meetings, where others were optional. All meetings were attended by representatives from SAP. All staff will have known the vendor was involved, but may not have been aware as to the extent of his involvement.

End User Involvement and Change Management

The Critical Success Factors which received quite a low number of positive responses involved the participation of the end user and Change Management. Just 35.7% of respondents answered Yes and 29.7% said Some-what).

With regard to whether the end users thought there was sufficient and effective end user training (38 % said Yes and 26% said Somewhat). With regard to whether respondents felt the organisation was prepared to manage the change process (38% said Yes and 20% said Somewhat).

The mean scores for this category were Low ranging from 0.86 to 1.21 (overall 1.01). This indicated that fewer respondents believed that these CSFs were present.

User training appears to be the most contentious issue. All staff has been given additional responsibilities to a greater or lesser degree depending upon their position in the structure. In all cases, staff will be required to undertake new tasks for example, purchasing large or small items, leave application, pay slip retrieval etc. All staff were required to attend rapid fire courses and left armed with an instruction sheet.

In many cases, appropriate training was not provided. If members of staff had not attended a training session, they would not appear on the system. The electronic Training User Manuals (TUGS) were not available for reference on line at “go-live” and for many months after. Some are still not available. When problems arise, there is a lack of support.

Most staff are still very unhappy with this situation. Unfortunately, staff are becoming demoralised with the lack of training and their attitude to the system is becoming negative.

Research Question 3

Were project team and end users satisfied with the ERP modules implemented?

In order to answer the third research question, respondents were asked to indicate the extent to which they were satisfied with the performance of the stated ERP modules by indicating if they had Not Implemented the stated module or had implemented and were Satisfied, Very Satisfied, Unsatisfied, or Very Unsatisfied.

The results displayed in Table 8 show the frequencies of responses for each of the stated modules.

The results were analysed for frequency of responses. The critical success factors were then grouped into three separate tables, based on Hoffman's (1998) Categories;

Table 14 and 15 is Finance Modules

Table 16 and 17 are H/R and Personnel Modules

Table 18 and 19 are Management Modules (Hoffman's Management and Logistics Category).

A Likert Scale was used to calculate the Mean scores for Satisfaction with each of these modules, with Very Satisfied = 3, Satisfied = 2, Unsatisfied = 1, Very Unsatisfied = 0 and Don't Know was disregarded.

Information was also illustrated graphically.

Part 3.1 Survey Data Summary.

Table 14. Satisfaction with ERP Modules Implemented/ Finance.

	Modules Implemented	Very Satisfied %	Satisfied %	Unsatisfied %	Very Unsatisfied %	Don't Know %
1	Accounts Payable	6	32	43	19	0
2	Finance	4	35	40	21	0
3	Accounts Received	4	34	39	23	0
4	General Ledger	5	26	43	23	3
5	Fixed Assets	7	24	39	15	17
6	Budgeting	5	22	46	20	7
7	Cost Control	5	20	48	21	6
8	Treasury Management	0	4	0	0	96
9	Average	4.5	24.6	37.25	17.8	16.1

Graph 14. Satisfaction with ERP Modules Implemented/ Finance

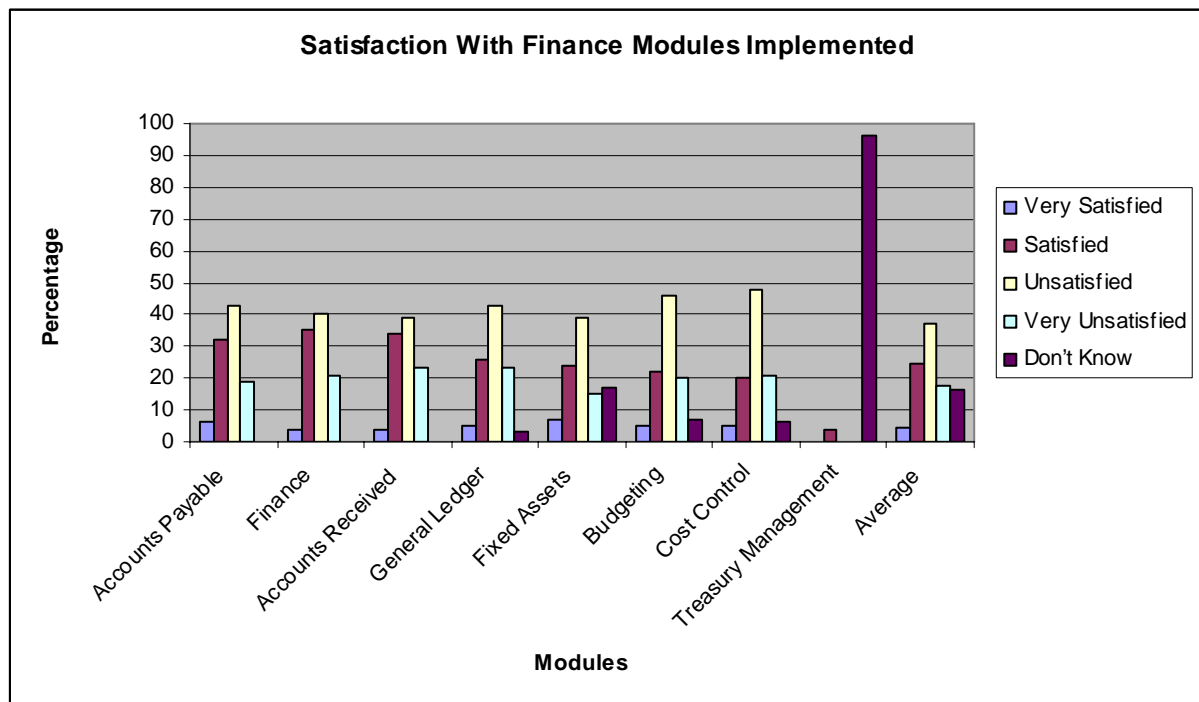
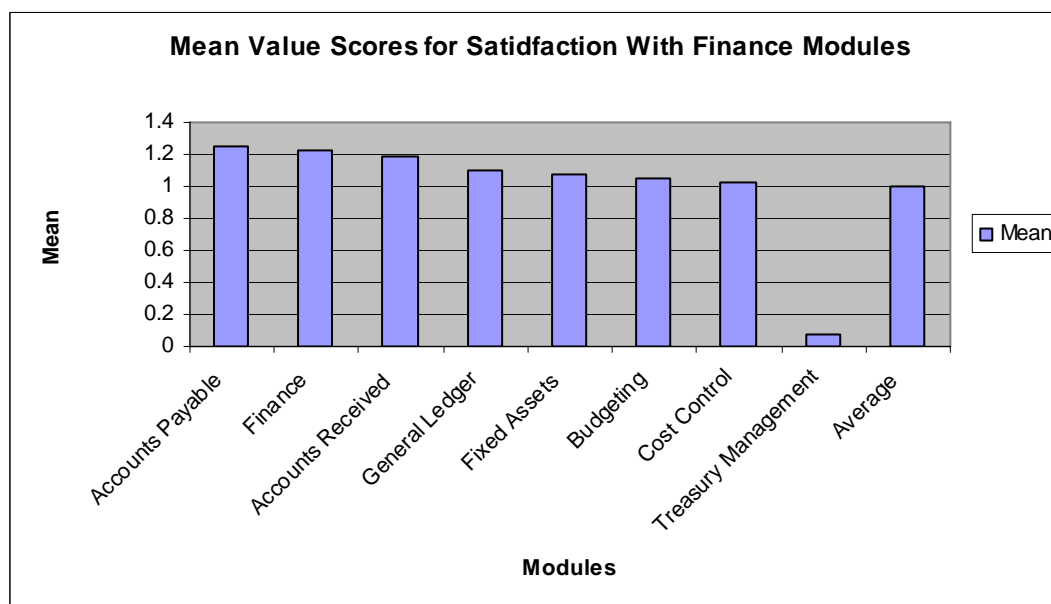


Table 15. Mean Value scores for Satisfaction with Finance Modules

	Modules Implemented	Mean
1	Accounts Payable	1.25
2	Finance	1.22
3	Accounts Received	1.19
4	General Ledger	1.1
5	Fixed Assets	1.08
6	Budgeting	1.05
7	Cost Control	1.03
8	Treasury Management	0.08
9	Average	1.0

Graph 15. Mean Value scores for Satisfaction with Finance Modules



Part 3.2 Survey Data Summary.

Table 16. Satisfaction with ERP Modules Implemented (HR and Personnel).

	HR Modules Implemented	Very Satisfied %	Satisfied %	Unsatisfied %	Very Unsatisfied %	Don't Know %
1	Employee Self Service	11	71	9	9	0
2	Personnel	8	47	35	8	2
3	Payroll	9	49	26	10	6
4	Human Resources	5	43	36	15	1
5	Training and Events	7	29	31	33	0
6	Average	8	47.8	27.4	15	1.8

Graph 16. Satisfaction with ERP Modules Implemented (HR and Personnel).

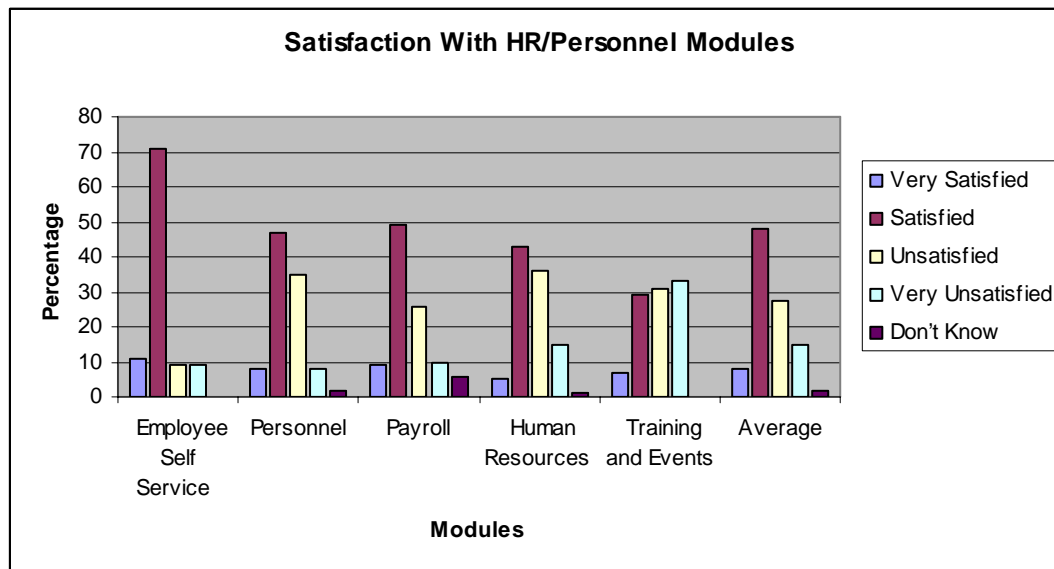
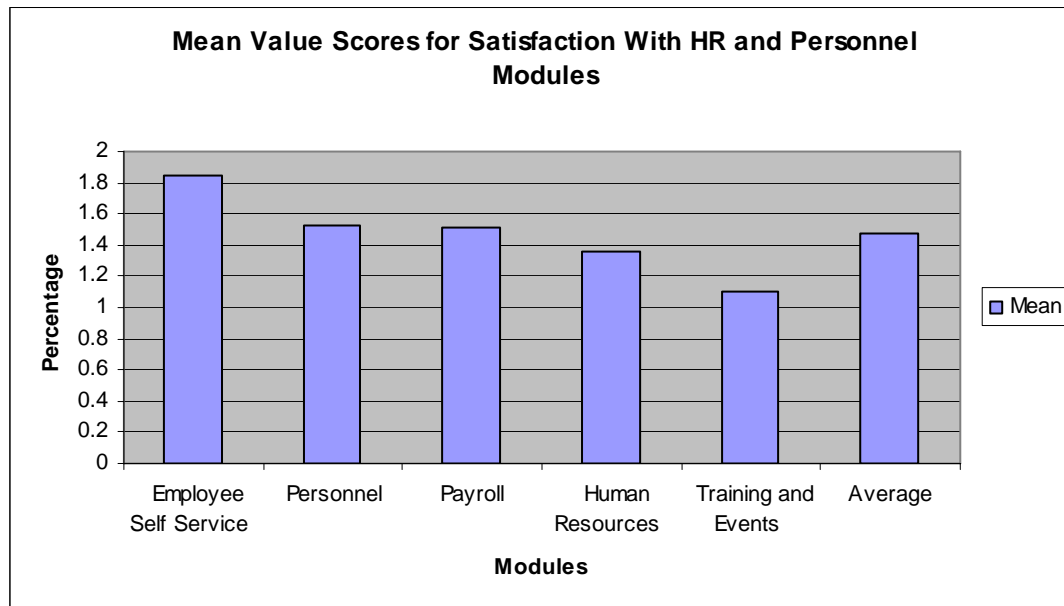


Table 17. Mean Value scores for Satisfaction with HR and Personnel Modules.

	HR Modules Implemented	Mean
1	Employee Self Service	1.84
2	Personnel	1.53
3	Payroll	1.51
4	Human Resources	1.36
5	Training and Events	1.1
6	Average	1.47

Graph 17. Mean Value scores for Satisfaction with HR and Personnel Modules.



Part 3.3 Survey Data Summary.

Table 18. Satisfaction with ERP Management Modules Implemented.

	Management Modules Implemented	Very Satisfied %	Satisfied %	Unsatisfied %	Very Unsatisfied %	Don't Know %
1	Materials Management	14	66	11	8	1
2	Project Management	21	49	17	13	0
3	Inventory management	12	61	12	10	5
4	Quality Management	5	66	18	9	2
5	Customer Service Management	5	41	31	20	3
6	Average	11.4	56.6	17.8	12	2.2

Graph 18. Satisfaction with ERP Management Modules Implemented.

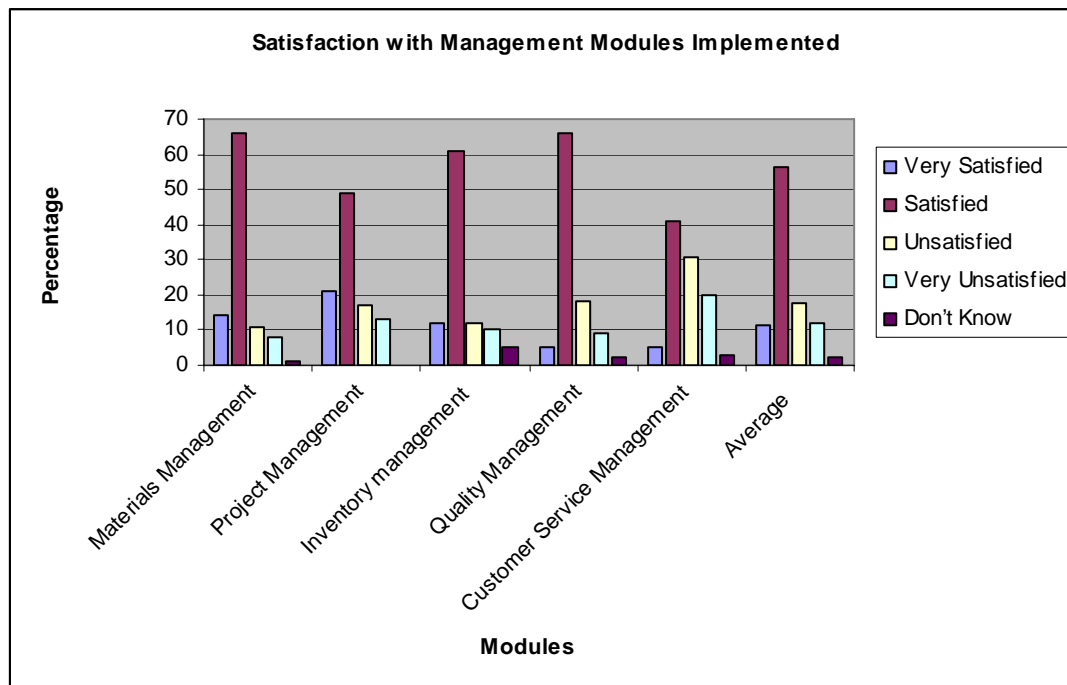


Table 19. Mean Value scores for Satisfaction with Management Modules.

	Management Modules Implemented	Mean
1	Materials Management	1.85
2	Project Management	1.78
3	Inventory management	1.7
4	Quality Management	1.65
5	Customer Service Management	1.28
6	Average	1.65

Graph 19. Mean Value scores for Satisfaction with Management Modules.

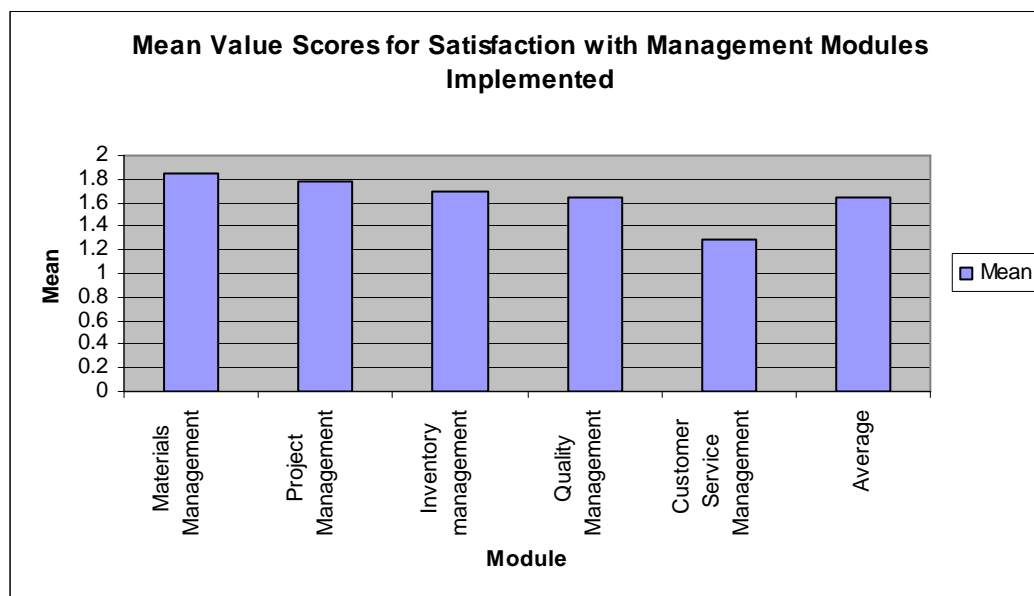
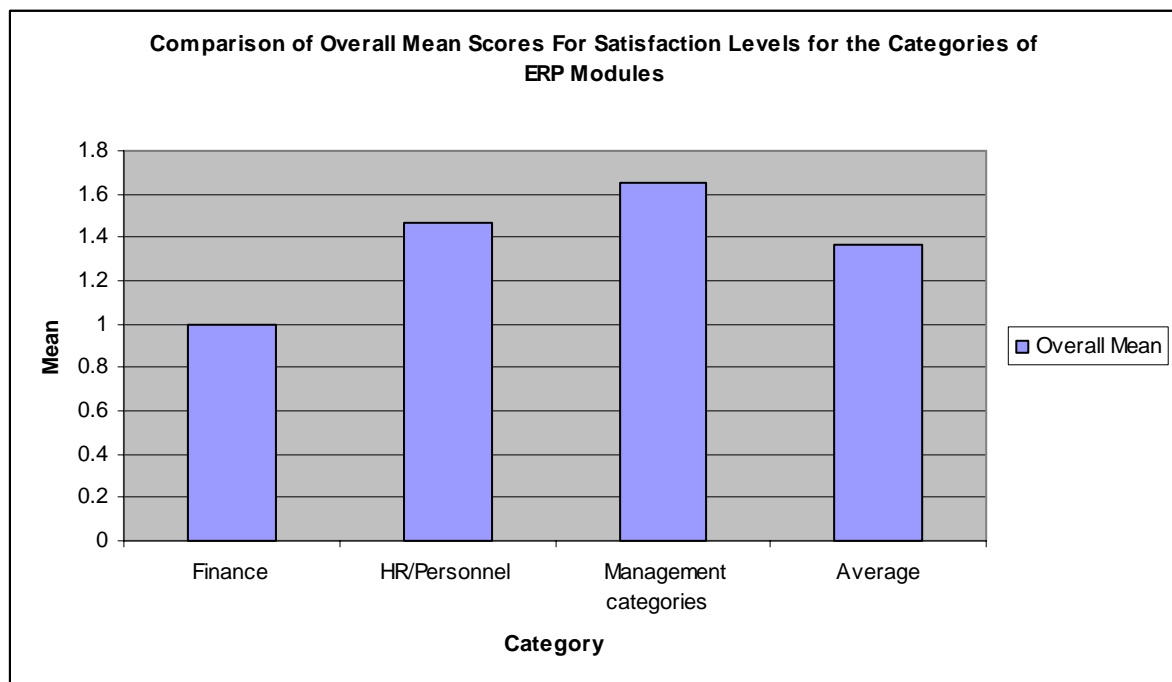


Table 20. Comparison of Overall Mean Scores of Satisfaction Levels for the categories of ERP Modules.

	Category of Modules	Overall Mean
1	Finance	1.0
2	HR/Personnel	1.47
3	Management categories	1.65
	Average	1.37

Graph 20. Comparison of Overall Mean Scores of Satisfaction Levels for the categories of ERP Modules.



Analysis

All of the modules listed have been implemented. The modules are used in lesser or greater degrees by the research sample, as each person is employed in a different field to the next. This section looks at the level of satisfaction associated with each module implemented.

The highest satisfaction level reported was with the Employee Self Service Module. (82% of the respondents combined Satisfied and Very Satisfied results). From a personal perspective, the reason for this is that this module is the one used by most people within the organisation. Everything from time management to booking leave is undertaken via this module for almost every member of staff.

Also scoring highly was the materials management module (80% said they were Very Satisfied / Satisfied). Again, the reason for this is probably because this module is regularly used by a high population of staff who have received appropriate training.

Inventory Management scored highly (73% said they were very satisfied/Satisfied). Similarly, Quality Management scored highly (71% said they were Very Happy/Satisfied).

Finance

All of the modules relating to finance received high Unsatisfied/Very Unsatisfied scores (on average 55% of respondents said they were Unsatisfied/Very Unsatisfied with the Finance module. The Mean scores for the Finance Category ranged from 0.08 to 1.25 (overall 1.0). This indicates an extremely low satisfaction rate with these modules.

The reason for this is probably due to the errors within the system. There appears to be constant and ongoing issues where staff is responsible for making payments in accordance with Council Standing Orders, but the system does not work. To compound this problem, there is a distinct lack of support, with no end to the problem.

Treasury Management recorded 96% of Don't Know, reflecting that most respondents do not use this module. Only a small number of the overall population and employees will be involved in this field.

HR/Personnel

The modules relating to Personnel and HR were quite equally balanced between Satisfied/Very Satisfied and Unsatisfied/Very Unsatisfied (55.8% versus 42.4%). The Mean scores for this category range from 1.1 to 1.84 (overall 1.47). This indicates a low rate of satisfaction with all modules in this category apart from Employee Self Service.

Again, from personal experience, this element is used by most employees on a frequent basis. Time issues, leave, booking training courses etc all operate through this module, which is not efficient, demonstrating frequent problems leading to frustration.

With regard to the Training and events module, there was a very high rate of dissatisfaction registered (64% combined Unsatisfied/Very Unsatisfied).

Management Modules

The modules relating to management received the highest number of positive responses (average 68% said they were Satisfied/Very Satisfied). Only the Customer Service module had a majority of unsatisfied responses (51% of respondents said they were Unsatisfied/Very Unsatisfied). The mean scores for this category range from 1.28 to 1.85 (overall 1.65). This indicates quite a high level of satisfaction with this category with the exception of Customer Services Modules.

The Materials Management scored the highest for Satisfaction (80% of respondents said they were Satisfied/Very Satisfied). The reason for this could be that there is such a high volume of materials purchased and used throughout the organisation, that this must be treated as a priority else everything stops.

Research Question 4

What problems and concerns did staff have before, during and after implementation of ERP and were these addressed?

The results were analysed for frequency of responses.

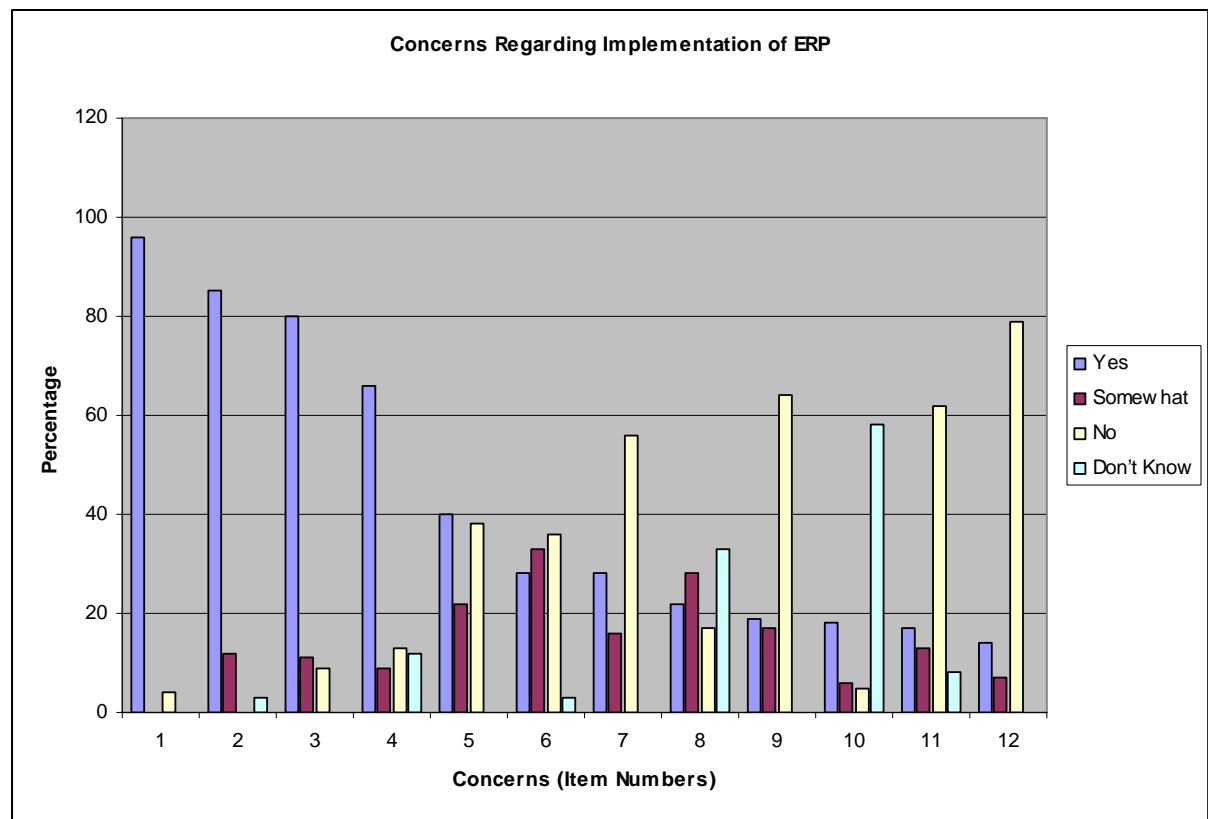
Information was also illustrated graphically.

Part 4.1 Survey Data Summary.

Table 21. Concerns Regarding Implementation of ERP

Item	Concern	Yes %	Somewhat %	No %	Don't Know %
1	Has ERP implementation necessitated the requirement of a new skill set among employees in terms of computer proficiency?	96	0	4	0
2	Did you use some other measure of success (other than return on investment) for the implementation?	85	12	0	3
3	Was employee morale negatively affected by ERP implementation?	80	11	9	0
4	Was the implementation project adequately funded?	66	9	13	12
5	Was your implementation timetable reasonable?	40	22	38	0
6	Was the implementation project adequately staffed to meet the project deadlines?	28	33	36	3
7	Would you consider the ERP implementation in your organisation to be a success?	28	16	56	0
8	Was your organisation prepared for the external/public's reaction to the implementation?	22	28	17	33
9	Was your organisation technologically prepared to implement?	19	17	64	0
10	Did you realise the expected return on your ERP investment?	18	6	5	58
11	Was your organisation prepared for the internal/employees' reactions to the implementation?	17	13	62	8
12	Was employee morale positively affected by ERP implementation?	14	7	79	0

Graph 21. Concerns Regarding Implementation of ERP



Analysis

This section explored the general reactions and concerns following implementation of ERP. Participants were asked to rate each question “Yes, Somewhat, No or Don’t Know”. The majority of respondents felt that the project was adequately staffed to some extent to meet the project deadlines and “Go Live” date (28% of respondents said Yes and 33% said Somewhat).

Similarly, the vast majority felt that the implementation of the ERP project was adequately funded (66% of respondents said Yes and 9% said Somewhat).

A small number (18% of respondents said Yes and 6% said Somewhat) said that they realised the Expected Return on Investments, whilst 58% of respondents said they didn’t Know. This is the highest number of Don’t Knows of any category. This is due

mainly to the low volume of staff as a whole having an involvement in the Financial Element of ERP. Most respondents (85% said Yes and 12% said Somewhat) said that they used some other measure of success regarding the implementation (these were explored in Part 1 of the survey).

The majority of respondents felt that the organisation was not technically or technologically prepared at the time of implementation of ERP (64% of respondents said No).

With regard to the reaction from employees following implementation of ERP (62% of respondents said management were not prepared for the reaction of the employees). This fits with the high number who felt that employee morale was negatively affected by the implementation of ERP. (80% of respondents said Yes the morale was negatively affected and 11% said Somewhat). Just 14% of respondents felt that morale was positively affected by implementation of ERP.

Almost all (96%) of respondents said that the ERP implementation required a new skill set amongst employees in terms of computer proficiency.

Half of the respondents (22% said Yes and 28% said Somewhat) felt that the organisation was prepared for the external/Publics reaction to ERP implementation. This may reflect that many of the respondents do not have much involvement with the Public/external sector? (33% of respondents said Don't Know for this element of the survey).

Less than half of the respondents (28% said Yes and 16% said Somewhat) felt that the ERP implementation was a success throughout the organisation (56% said No, Implementation was not considered to be successful).

Part 4.3 Analysis of Additional Information Regarding Concerns Raised by Participants.

Q a. What problems did you encounter if any?

Q b. What do you think could be done differently?

Q c. Do you have any other comments regarding the implementation of ERP?

Having considered the 'open points' raised by participants outside of the structured questionnaire, several key areas appear to be fundamental to the concerns of the end user. These areas are outlined as follows:

Change Management.

Project Management.

System/Software.

Training.

Perception of Cost

Training.

Encourage buy-in.

Testing before "Go Live".

Consultants.

Delays/Vendor issues.

With regard to Change management, end users generally felt that they were not really part of the project. People were told that ERP would be implemented by the proposed Go Live date regardless of concerns. Staff had genuine fears regarding job security, but top management denied that job losses were inevitable, thus resulting in low morale.

With regard to project management, people generally felt that this had been undertaken quite well. However, some staff did mention lack of control and lack of measurement of success. This is likely to be the more senior staff at management level. People were obviously aware that the go live date had been set and achieved, but as the ERP system had failed in so many areas, they related this to a project management issue.

With regard to system software, a high volume of comments were raised. All stated that ERP was installed to increase efficiency, but that many of the key modules did not work for example, payment of accounts, ordering, purchasing.

Many respondents felt that they had not received sufficient training to operate the SAP system. Training that had been provided was too short, too quick and too close to the go live date, with not enough time for practice. People were then under pressure to use the system whilst undertaking their normal duties.

Respondents frequently mentioned the cost of the investment, and were concerned this would be paid for by job cuts.

Some comments raised the importance of commitment and buy-in. All staff was expected to buy-into the system, but few were actually encouraged or involved at a critical time. Some people were aware of the project team, but many were left outside of the changes until go live.

Many comments were made with regard to testing. The general opinion of staff is that the ERP system has failed to deliver, leaving the organisation in chaos and actually in a worse situation than before. The key drivers for the ERP project were finance and efficiency. Both systems were not working at or after go live resulting a general feeling of failure of the project.

The responses to the above open questions are included in Appendix E.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary of Research Findings

The general findings of this research are that many of the improvements that participants expected from the ERP system were actually achieved. These include improved communications and reporting, and streamlining of business processes. Other expected benefits were not achieved. These include customer relationship and supply chain improvements, improved overall efficiency and a return on investment.

The research also found that many of the CSFs proposed by previous research were in place before and during implementation of this project. Top management involvement was considered good and project implementation processes were in place. General project management skills and knowledge were less apparent but nevertheless present to some degree. The CSFs that were clearly absent however were End User involvement and training and the organisation being prepared to manage change. This supports McAlary (1999), who argues that successful ERP implementation depends on successful end user training. Also, the lack of end user involvement in this case supports Brown's (2001) suggestion that implementation quality improves when end users are sufficiently involved at all stages.

It is proposed that these failings were key factors in the overall lack of satisfaction with the modules implemented, in particular those concerned with Financial Processes. This was compounded by many of these modules not working properly at Go Live and beyond, and by the resulting chaos that employees have had to deal with.

A reasonable level of satisfaction was noted for the management modules, mainly because it allowed greater controls and monitoring compared with the legacy system. Also, the level of satisfaction recorded for the HR/ Personnel modules was reasonable, mainly because it allowed the employee to have access to their own HR file, training and holiday scheduling which was not present in the legacy system.

The survey of problems and concerns highlighted the main reasons why there was overall low satisfaction with the ERP system and why the majority of respondents felt that the project had not been successful. The most serious issues were:

- The organisation being unprepared for the employees reaction the ERP implementation and being unprepared to manage change
- The lack of end user involvement
- Lack of appropriate and timely end user training
- Employee morale negatively affected
- The organisation being technologically unprepared to implement
- Inadequate staffing levels to meet project deadlines
- Implementation timetable not totally reasonable
- New computer skills required by virtually all employees
- Lack of adequate testing prior to “Go-Live”
- Difficulty in measuring success.

This research concludes that even when the majority of CSFs are in place, successful implementation is not assured unless all the CSFs are in place, in particular those relating to End User involvement and training, and change management. This research proposes that there is another key CSF that few researches have highlighted, with the exception of Nah et al. (2001), which is the need for testing of software prior to Go Live. Our findings contradict Koch et al (2001) Big Bang Strategy. We propose that in addition to ensuring that CSFs are in place, consideration must also being given to possible Failure Factors and ensuring that these are avoided.

The research acknowledges that "While systematic knowledge about ERP success factors continues to grow, so too does the overall level of confusion about the practicality of ERP because success stories are matched or exceeded by incidents of failure" (Buckhout as cited in Miranda, 1999, p.1). According to Donovan (1999), the idea that ERP implementation is strictly a technology project because software is involved is wrong; and, in fact, is one of the leading causes of ERP failure.

Systems driven implementations are more likely to fail. If the implementation is treated as simply an information technology project, the ERP system will never realise its full capabilities. Umble and Umble (2002) have stated that "successful implementations are

typically headed by an individual outside the IT department" (p. This reiterates the importance of involving End Users from the outset and during the implementation.

Some respondents pointed out that the ERP implementation may have been adversely affected by recent BPR. This concurs with Welti (1999), who argues that BPR should be done after ERP implementation so that system users will have a better understanding of functionality and potential benefits of ERP software.

General Summary

In the present article, we have examined various key elements relating to the successful implementation of an ERP project and the factors which relate to failure.

The trends observed (Dorobek, 2001; Blick *et al.*, 2000) and the efforts by ERP vendors to adapt their products lead one to believe that the adoption of these systems in public organisations will continue to increase, as has been the case for a long time in the private sector. As the issue of e-government becomes more critical for public organisations, integrated systems are required in order to enable public sector organisations to better manage their processes, with an emphasis on best value, cost savings and quality of service.

While the experience to date has been that ERP systems can provide benefits, it has also shown that realising these benefits is not automatic and that the risk of partial or total failure is still very high. ERP adoption, implementation, usage and evaluation issues must be better understood.

ERP is here to stay, for some time at least. For that reason, we must try harder to ensure successful implementation of ERP systems. This will involve benchmarking the existing systems within the organisation as an accurate measure of success, rather than accepting successfully achieving "Go Live" on the day specified as a measure of success. ERP projects are not a success just because the vendor says so. The vendor and consultant will be onto the next project leaving the organisation with the headache of managing a perpetually failing system, which nobody (except the many daily users) wishes to admit to. However a thorough analysis of the reasons for which an organisation undertakes an ERP project is essential, as many studies have found such projects to be very costly and risky (e.g., Besson, 1999; Umble and Umble, 2002).

With regard to the benefits sought through implementation, researchers agreed that ERP software allows for increased communication within an organisation. Many organisations seek to implement ERP systems in order to achieve easier access to reliable information, elimination of redundant data and operations, reduction of cycle times, and cost reductions.

In regard to critical factors for a successful implementation, researchers consistently cited top management support as the most critical factor for successful implementation (Bingi et al. 1999). However, our research indicates that End User involvement and training seems to also be critical to success.

ERP should be the key process to enhance performance management and efficiency. This is at the heart of the political and public interest. (Dalton and Dalton 1988, pp. 33, 34) Argue there is no single best measure of performance; rather the measure adopted serves some interests as opposed to others'. Unfortunately, to make things worse, the cost of implementing an ERP system is very high (Jeffrey, 2001; O'Leary, 2000).

Recommendations

The purpose of this study was to present the perceptions, findings and opinions of a sample of 100 ERP users. These users consisted of implementation project team members, and staff employed at all levels throughout the organisation.

The following recommendations are split into three sections, a) recommendations drawn from literature and b) general recommendations made by the writer on the basis of experience as an active change manager during implementation of SAP ERP, supported by the findings of the research project, c) Recommendations for future research.

Recommendations Drawn from Literature

- In addition to getting involved, lead the implementation and take responsibility for the results (Buckhout, Frey and Nemec, 1999; Donovan, 1999).
- Ensure that the objectives of the project are linked with company strategic priorities (Bonerjee, 2001; Forger, 2000).
- Be champions for the implementation at all times and motivate employees from all levels of the company to get involved (Mendel, 1999; Taylor, 2000).

- Keep the following criteria in mind when defining ERP project objectives: clear, measurable, controllable and the savings quantifiable (Wolti, 1999).
- Plan for the end of the project before the beginning, i.e., know exactly the boundaries or scope of the project (Donovan, 1999).
- Define the exact business value to derive from the ERP project (Sweat, 1999; Jeffery, 2001).
- Plan to implement the ERP system in short, focus phases with many milestones (Forger, 2000; Mendel, 1999).
- "Create an ERP implementation road map, or program document" which clearly identifies milestones and task relationships (Plotkin, 1999, online).
- Know what to do every step of the way - make sure the plan covers mission, operations, system implementation and education (Bucker, Inc., n.d.).
- Include the best managers of the company in the project team if possible. If not, at least maintain close communication with them (Campbell, 2000).
- Recruit technologically competent people who understand the company business into the project team (Mendel, 1999).
- Use consultants strategically - don't focus just on costs and sacrifice quality and time (Macvittie, 2001). On the other hand, avoid over-reliance on the consultants - learn from them (Sweat, 1999).
- Foster teamwork and the culture that is oriented to solve problems (Savin and Silberg, 2001).
- Ask the end-users to perform daily functions on the new system and use feedback to improve the implementation (Martin and Sara, 2001).
- Organise a team of "super-users", who will be the internal experts of the ERP system. They should learn the system thoroughly and actively participate in the implementation process (Plotkin, 1999).
- Integrate business process discussions into training and pilot testing, encourage them reflect on daily tasks (Schultz, 2000).
- Include managers in the training because they need to see first-hand the functionalities of the new system in addition to offering special insights (Plotkin, 1999).
- Train the top managers on the "big pictures" - concepts and applications of ERP (Bucker, Inc., n.d.).

- Involve IT early in the project to validate ERP sustainability and consult their expertise during implementation (Spangenberg, 1999).
- Make sure to reflect business needs in the application - avoid making decisions based on IT recommendations alone (Sweat, 1999; Savin and Silberg, 2001).
- Minimise levels of reporting within the project team, but be clear about what you are reporting (Bucker, Inc., n.d.).
- Empower project team and support rapid decision-making relating to ERP implementation (Forger, 2000).
- Streamline project team communications (Scavo, 1995).
- Track project deliverables and milestones rigorously (Jeffery, 2001).
- Manage tasks along the critical path with top priority to prevent delays (Kulik, 1997).
- Create an efficient work culture that treats deadlines seriously (Forger, 2000).
- Implement in phases if possible to avoid setbacks in both management support and time (Sweat, 1999).
- Test program and processes thoroughly to minimise problems when going live (Martin and Sara, 2001).
- If necessary, develop temporary solutions to bridge the old processes to the new system (Plotkin, 1999).
- Employ change management techniques to cope with rejections (Forger, 2000).
- Ensure sufficient implementation support from the vendors and consultants during the initial days of going live (McAlary, 1999).
- Cost – Ensure the project stays within budget.
- Identify potential ERP project risks, and come up with plans to prevent them from becoming problems (Kulik, 1997).
- Know how to respond to risk occurrences ahead of time (Weiti, 1999).
- Have proactive measures in place to deal with scope creeps (Desai, 1997).
- Obtain management support to minimise demands for unimportant functionality changes to the ERP system (Buckhout, Frey and Nemec, 1999; Wagle, 1998).
- Minimise customisations to the ERP software (Scavo, 1998; McAlary, 1999).
- Establish a realistic project budget with contingency reserves to cover unforeseeable costs (Bowen, 1998).
- Regularly monitor project implementation costs and schedule (Jeffery, 2001).
- Stick to the project schedule and planned resource usage (Walti, 1999).

- Help employees understand the impact of ERP on their work and the critical nature of the project (Taylor, 2000; Plotkin, 1999).
- Sell the project to all employees using various marketing activities involving project team members and top management (Welti, 1999).
- Gain user buy-in early on by reviewing business processes before starting the project (Savin and Silberg, 2001).
- Turn the ownership of the project over to the end users (Scavo, 1995).
- Make them feel like they are part of the ERP implementation process (Mendel, 1999).
- Make the ERP project a management priority throughout the company (Welti, 1999).
- Tie manager performance evaluation and/or compensation to the success of ERP project Buckhout, Frey and Nemec, 1999).

General Recommendations drawn from research

- It is recommended that organisations considering ERP system implementation continue to research ERP functionality in order to identify and achieve the expected benefits.
- It is recommended that organisations continue to implement strong change management within their organisations.
- It is recommended that other measures of investment return also be considered when measuring the return on investment for ERP implementation.
- It is recommended that organisations work to ensure employee buy-in and top management involvement.
- It is recommended that organisations hire competent consultants and skilled project team members and try to avoid scope creep (the addition of tasks outside of the original plan) of the project and to use the systems efficiently after implementation.
- It is recommended that organisations allow sufficient time to implement all of the modules properly, to ensure the system is fully operational at “Go Live”. This will improve the chances of success and a return on their investment.
- It is recommended that leaders within public-sector organisations ensure an accurate brief is developed to enable ERP vendor to implement appropriate modules to decrease the gap between what is expected and what is realised.
- Involve staff at all levels to encourage ‘buy-in’ at an early stage.

- Provide good quality and timely training for all staff.
- Ensure that benchmarking and accurate process mapping is undertaken prior to the design of the system and modules to be implemented.
- Ensure that the ERP system is able to do what it says on the tin
- Make BPR changes after implementation of ERP rather than before
- Involve end users throughout the implementation process
- Test, Test and Test again.

Conclusion

This area of the study makes use of previous case studies to identify ERP implementation and associated problems. More importantly, it examines and discusses many critical failure factors contributing to failed implementation.

It is clear ERP can be an asset to any organisation. Following a substantial investment for the purchase and successful implementation, ERP has the potential to save an organisation a significant amount of money by streamlining processes and maximising efficiency.

However, as covered in this section, literature review and the research undertaken, it is clear that ERP may not be the ‘golden fleece’ that organisations have been searching for.

The ERP journey will commence at top management level. In the case of many public service organisations, this will usually be an ambitious new Chief Executive officer, keen to establish a top level reputation for saving a significant amount of money for the organisation within their normal tenure of employment of around five years.

ERP vendors will rally to the cause, rubbing their hands at the possibility of creating another ‘slave to the system’ whilst at the same time, making them pay dearly for the experience. A system fortuitously will be available to meet the needs of the organisation, along with the promise of early implementation, typically six months, with the system realising a return on investment after the first year.

Once committed, the scene is set and the game begins. Unfortunately, the way in which the system is sold is ambiguous. Typically, the question of benchmarking and ongoing monitoring is not raised. Like a used car salesman, “it’s a great system sir- trust me”.

Project teams are established very quickly, but processes are not mapped. The savings are quick to see, BPR will result in job losses. Union involvement is critical, as redundancies and job losses will see claims for unfair dismissal etc. Staff will start to be introduced to the new system, changes, improvements and financial savings through a series of staff meetings with the Unions present. The staff worries about inevitable consequences, and ask the question about job losses. The Chief Executive will deny this as an option. The organisation will gear itself for the onset of a massive culture change.

At this stage, top management will begin to realise the entrapment element. So much has happened so quickly, and each manager is strongly encouraged to buy into the implementation, knowing that they are just as at risk. Moving quickly, there is no turning back.

The GO Live date will be approaching fast and problems will already have been identified. Errors and incompetence in the financial area is usually the key driver for an ERP system as in this case. Unfortunately, the key area still has a major number of issues. At Go Live, the solution is to switch off the Legacy system and sweep all the unpaid invoices under the carpet. An apology to people requesting their payments will suffice.

The vendor will achieve the Go Live date and duly claim the system is successful as promised, and his team will leave site within one month after. The project team will dissolve leaving a small number of staff to deal with queries from hundreds of staff.

Training will be arranged which will see a massive number of short courses bombarding staff to demonstrate how the system works. Confused staff will be sent away (instructions in hand) to operate a system which does not work. Problems reported will remain unresolved for months to come.

After several months of attempting to book leave, complete time sheets, buy pencils, undertake PR&D forms, make purchases, make payments etc, all of which are not working, staff become demoralised, and rebel against the system.

Without considering exactly what an organisation actually does, it is impossible to design and implement a new ERP system without a very high risk of failure.

I am confident that if process mapping was undertaken accurately prior to commitment to ERP, this would significantly improve the possibility of implementation success of ERP. Unfortunately, in my experience, personal research has found that a robust and accurate process mapping exercise is never undertaken prior to commencement of ERP implementation, rather the client is sold or mis-sold a system which is clearly an off the peg solution for the vendor to make a significant amount of money very quickly. Once installed, the customer is forced to continue to pay the vendor to return to site to make alterations and corrections to the inefficient and potentially failing system at his cost.

It is clear that the role performed by consultants is important for filling the knowledge gap within the different phases of ERP implementation. Project managers should exercise effective control and monitoring of the ERP project and ERP consultant effectiveness. BPR should also receive attention for all ERP implementation projects, as this factor is important for matching business processes to ERP system functions.

It is hoped that more studies will be conducted in future in order to further examine the importance of bench marking and process mapping prior to ERP implementation to highlight the main reasons for failure, enabling both practitioners and academic researchers to discover the best ways to reduce the failure rate of ERP implementation.

Although a significant amount of discussion has orientated around the negative elements resulting in the failure of ERP systems, I am confident that ERP does have a place in most organisations, and will achieve what it is intended to achieve, provided it is the correct system and is correctly installed.

Recommendations for Future Research

This study has only considered ERP implementation in the public sector. The following recommendations for future research in the area of ERP implementation are as follows:

- Conduct further research to determine the technical and business process issues that affect ERP implementation in the public sector.
- Conduct further research on the specific outcomes of ERP implementation in the public sector, preferably at the time of an actual implementation project.
- Conduct a study on specific decision making processes and their relation to the success of the ERP implementation.

- Conduct a specific study on the Benchmarking of existing systems prior to the implementation of an ERP project, to accurately measure success or failure of an implementation project.

The prerequisites identified and recommendations presented in this study are not intended to be all-inclusive. Rather, they represent a way of addressing the challenges of implementing an ERP system, from the project management perspective.

It is anticipated that future research can go in two directions: 1) horizontally - expanding the focus of research from project management to include change management, knowledge management, risk management, culture and other disciplines; and 2) vertically - conducting more detailed research in the project management discipline, such as validating the recommendations presented in this study through case study of actual ERP implementation projects.

APPENDIX A
SURVEY COVER LETTER (distributed by email)

Personal Survey Code: XXX

Dear XXX:

I am currently studying for a Master of Business Administration (MBA) with the University of Chester, and the final stage of the course requires me to undertake a research study.

My chosen field of study involves the implementation of enterprise resource planning (ERP) software. The purpose of my research is to consider previous studies in this field to determine and understand critical success factors for implementation of ERP projects.

In order to undertake this study, I have chosen to ask a total of one hundred staff to complete a questionnaire. Participants have been chosen from various teams within the organisation and at all levels within the hierarchy to obtain a representative sample of comments.

The completed questionnaires will not bear the name of the respondent to ensure anonymity. A unique survey code will be used only for my personal use to track details during assessment. The questionnaire will take approximately 15 minutes to complete.

I should be very grateful if you would reply to me by tomorrow evening to confirm **YES** (you would be happy to take part in my study) or **NO** (you would rather not take part in my study).

If you agree to participate in this study, I will send the questionnaire to you, along with a request for you to complete and return the same within five days of receipt.

If you do take part in this study, I should be grateful if you would treat the questionnaire as confidential, and to complete the same without collaboration or assistance, and to answer each point honestly and as accurately as possible.

If you have any queries regarding the questionnaire, please do not hesitate to contact me on 442542.

Thank you in advance for your assistance.

Regards,

Jim Turton

APPENDIX B

PARTICIPATION LETTER (distributed by email)

Personal Survey
Code: **001**

Dear XXX,

Thank you for your early response, and your willingness to participate in my study.

I should be grateful if you would complete the enclosed questionnaire and return it to me within five working days.

Your personal Survey Code is **001** which should be quoted if you contact me by telephone with any queries.

As previously mentioned, I should be grateful if you would treat the questionnaire as confidential, and to complete the same without collaboration or assistance, and to answer each point honestly and as accurately as possible.

Completed questionnaires should be emailed to sender.

In addition to the questionnaire, I should be grateful if you would make any additional comments regarding the implementation of ERP. Comments may relate to personal issues, training or any other element you feel should be addressed or improved.

If you have any queries regarding the questionnaire, please do not hesitate to contact me on 442542.

Thank you in advance for your assistance.

Regards,

Jim Turton

APPENDIX C

THANK YOU LETTER (distributed by email)

Personal Survey
Code: **001**

Dear XXX,

I write to confirm that I have received your completed questionnaire. The details will be collated and assessed against the other respondents.

May I take this opportunity to thank you for giving up valuable time to complete and return the questionnaire, which I hope you found interesting.

Once complete, I will be more than happy for you to see the completed study if you wish to do so.

Regards,

Jim Turton

APPENDIX D

Feedback Regarding Problems Encountered During Implementation of ERP

Change management

Not enough training.

Change management was largest challenge – additional responsibilities placed on all employees.

Getting users to change processes to match system best practices was difficult.

Not enough encouragement from employer resulting in the lack of buy-in.

Significant changes to business systems driven by cost savings. This resulted in a high number of job losses.

Communication/Consultants

Consultants underestimated the business requirements.

Consultants were not knowledgeable of anything outside their functional area, and some did not know their functional area.

Developed a lot of work-arounds, later discovered standard functionality that accomplished the same objective.

Consultant appeared to understand the requirements of the public sector, but system did not work at “Go Live” or beyond.

The consultants appeared to be ill-prepared for our situation, and many promises were not kept regarding specifically requested functionality.

Many concerns prior to “Go Live” were not addressed.

Not successful, may have been less expensive hourly rate, but expertise in SAP skills definitely lacking.

Live system passed over to client too quickly – so IT had to deal with a massive volume of faults, on top of normal IT problems. Resources swamped affecting overall efficiency.

Costs

Limited Budget to implement necessary components, that will continue to have a serious impact on the organisation.

Knowledge transfer from consultants to IT department.

Cost was the largest problem. Has it been worth it?

Can't see efficiency improvements – system still not working several months after “Go Live”. Who pays?

Do we pay for the inefficiency of the new system?

Project management

Project appears to have been well resourced throughout implementation, with a team dedicated to the project.

The organisation needed to be completely reorganised as part of ERP system, with peoples roles changed to align with SAP. This resulted in significant job losses.

SAP ERP was implemented at the same time as the Council wide job evaluation programme, closely followed by an organisational restructure. Too Much – Too Quickly. Result is demoralised staff who remain.

Some units did not implement modules due to staffing/workload issues.

Lack of training in good time.

At “Go Live”, the new system was switched on, old one switched off. This left a high vlume of transactions unresolved putting pressure on staff and managers.

Loaded historical data on a "hurry up" basis, resulting in numerous data errors.

Change Agents were trained and available to deal with queries.

Business/functional representative resources had to continue day to day business activities as well as work on the project which was a problem at times. Existing business process knowledge was unavailable at times due to staff attrition through retirement or redundancy etc.

High customisation demand from users.

Growth in transaction count and database size ultimately caused performance issues.

Project management should have considered cultural elements of implementation. To ignore staff has demoralised and de-motivated staff.

Internal resources, primarily expert users, leaving the organisation shortly after go-live.

TUG's (Training User Guides) are difficult to locate and differ to what is seen on the portal.

It was a big undertaking in a short period of time. There was a lot of post-go live work and clean up.

Keeping on track with the project. Some modules fell behind with setting up business processes.

In an attempt to keep staff informed, they were swamped with lengthy such lengthy emails, they simple deleted them without reading.

BPR should have been left until the ERP system was working properly.

Delays.

No delays to implementation and “Go Live” achieved.

However, after “Go Live”, it was apparent that not all was working, so was the target actually achieved?

Training was not started early enough, so staff were untrained after “Go Live”.

Several months down the line, the system is still not working.

System/ software

Data transport from development to production was problematic. Modifying schemes to allow for time management criteria was not resolved until after implementation.

Difficulty in getting the correct security access to the right people in time.

Understanding of the reporting capabilities was difficult without being able to create in a test environment.

End user reporting was a problem, trying to reduce the number of custom reports.

Minimal time/resources on legacy data clean up lead to disasters and lost functionality gains.

Project team was too small to assist staff prior to “Go Live”.

Problems where the system would not handle the current processes. It did however, force changes that were good.

Software does appear to be good, but is it correctly implemented?

Go Live was achieved but why was the system not properly tested before that?

Training

Did not train our people well enough on what an integrated system means in terms of doing their job and it's impact on others.

After “Go Live”, staff appears to be on their own. If you have not received formal training in certain areas, you will not be allowed to access areas of SAP.

Training request element may not have been working, so staff requesting training can't be trained. They are made to feel this is their fault.

TUG's (Training User Guides) are difficult to locate and differ to what is seen on the portal.

Vendor Issues

Vendor appears to have worked well with the organisation.

No benchmarking exercises undertaken by vendor prior to implementation.

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